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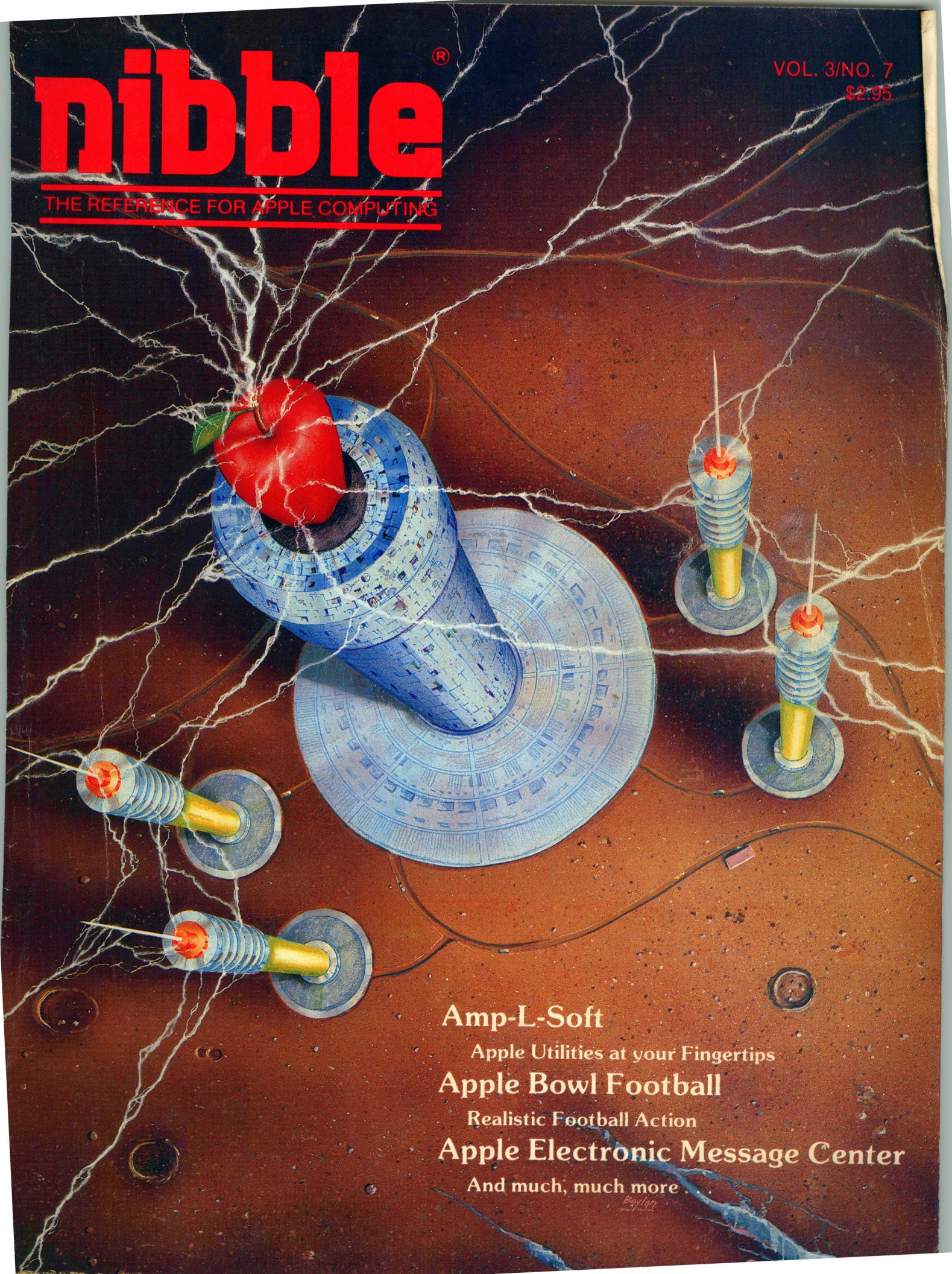

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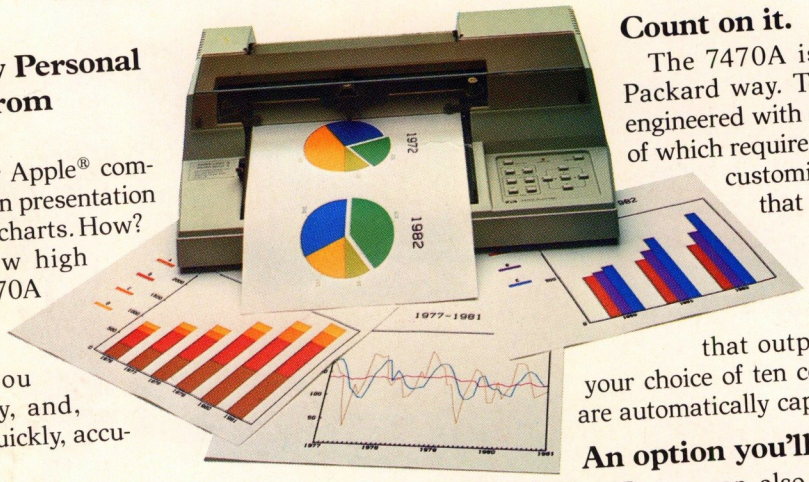

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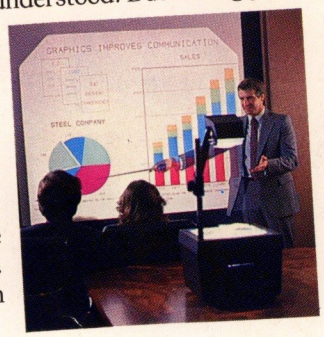

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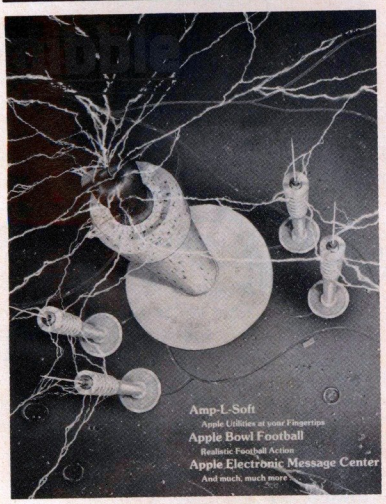

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EDITOR/PUBLISHER
Mike Harvey
ILLUSTRATOR/DESIGNER
Len Boylan
CONTROLLER
Adele Harvey
CIRCULATION ASSISTANT
Mara Gurski
ADVERTISING MANAGER
Alan E. Gold
P.O. Box 639
Lincoln, MA 01773
(617) 259-9710
MANAGER, DEALER SALES
Tammy J. Arico
TECHNICAL EDITOR
David P. Szetela
SHIPPING & LOGISTICS
David M. Sears
ADMIN. ASSISTANT
Kelley M. Magiera
ACCOUNTING
Gladys Hillman
CONTRIBUTING EDITORS
Alan Floeter
Rick Connolly
Les Schmeltz
William Reynolds III
Craig Crossman
Glenn Teman
Patrick A. Clyne
Gary Little
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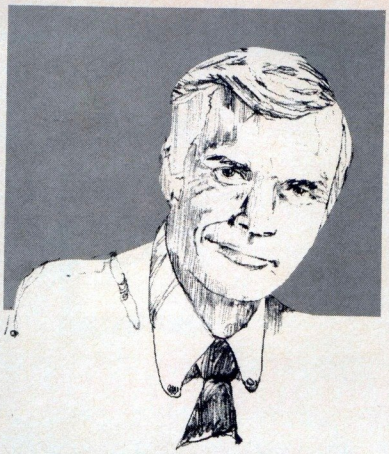
EDITORIAL



CHANGE! ENEMY OR ALLY?

Few things are changing as rapidly as the micro/personal computer industry. With a dizzying array of new product announcements of computers and peripherals, one might almost revert to an old adage:

"If you don't like what you see . . . Wait a moment . . . It'll change."

I can remember a time when all one had to do to "keep up" with the whole computer industry was to read Datamation and watch IBM and the Seven Dwarfs. But all that's changed.

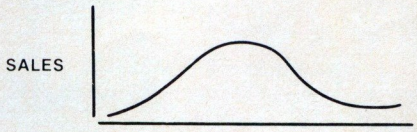
Change has brought almost miraculous new technologies and products . . . and entrepreneurial opportunities . . . and stresses.

Remember that growth brings problems. And if you don't have problems, if you're not moving ahead . . . you're moving backward. **There is no such thing as "static success."**

So, how does all that apply to "You, Inc."? Very simply, you have to begin to:

PLAN FOR . . . AND ACCEPT . . . CHANGE

Products have **Birth**, **Life**, and **Death**. It's called the "Product Life Cycle" and it looks like this:



If you expect to indefinitely play out the string on your current products (regardless of their success), your current image, or even your current form of business, you may be courting disaster.

Change is one of the hardest things for a businessman to accept . . . particularly when it means challenging "the way things have always been."

It's even harder for you, as an entrepreneur, to accept change if your business is **succeeding**, because the business is YOU. You made it! You are it!. . . or at least you feel that way.

So, when one of your people comes to you and says:

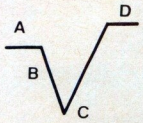
"We need to change **your documentation style.**"
or
"**Your** last Ad really didn't get the message across."
or
"**Your** product needs a new, enhanced version."

Your initial reaction, unsaid, may be **"B...S..."**. After all, everything's going great! WHY CHANGE?!

CHANGE . . . THE ENEMY

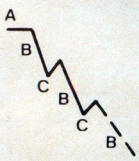
Change for the sake of Change is the enemy. Rapid, frequent change can disrupt the continuity of your product, your image, and your people. It's unsettling to people to be a part of constant change. . . because it tends to evolve to chaos. Change without a plan, without a reason, and without an expected result can disrupt your market and demoralize those around you.

There is a phenomenon called **"The Change Curve"** and it looks like this:



A is the state of equilibrium **before change**. **B** is the dip in productivity/market response which occurs when change is introduced. **C** is the turnaround which occurs when change begins to be assimilated. **D** is the (hopefully) **higher level** of productivity/sales/or whatever, when the change is fully productive.

Constant and rapid change looks like this:



Before one change is assimilated, another one is introduced. . . and the curve continues to spiral downward.

And even if one of your changes turns out to be blindingly successful, you won't know **which one** it was (that produced the success). Was it the most "recent" strategy? Or the one before that? Or the one before that one? Uncontrolled change can destroy you.

NO CHANGE . . . AN ENEMY

Conversely, impulsively **resisting change** can be equally dangerous. And there will be a great temptation to issue the "Steady as She Goes" directive. It's no fun to be told that your product may be coming to the end of its life. . . or that you need a new ad campaign. . . or that your pricing stinks. . . or any one of a number of other criticisms.

The battlefield of business is strewn with the broken bodies of **New Ideas** which were crushed and cast aside without having the chance to be heard and tried.

MAKING CHANGE AN ALLY

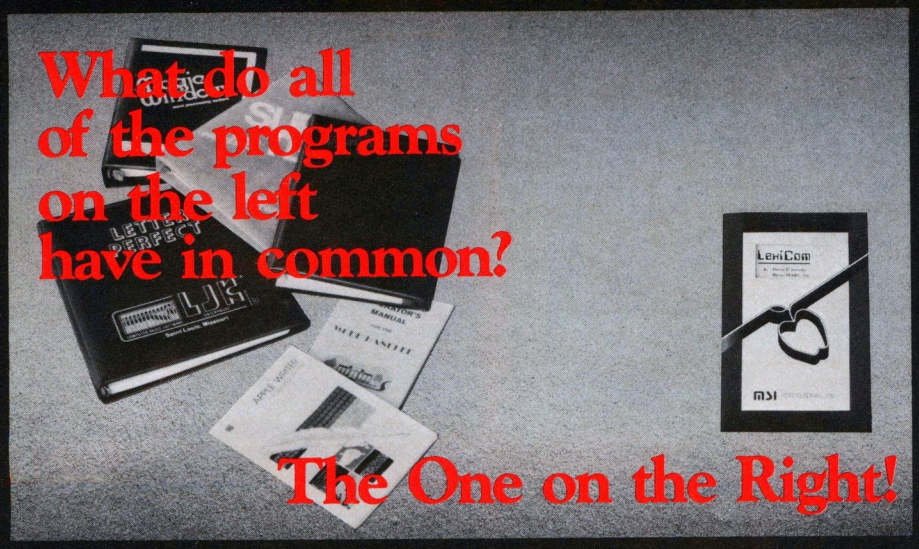
The first requisite to making Change an ally is to judge new ideas on their merits. . . on their business effect. . . and not on your own preconceptions. Step outside your own ego and look at expected **results** of proposed Change.

Use "brainstorming" to stimulate new ideas and use the ideas to develop **alternate scenarios** showing the effect of change. If you're planning a promotional campaign for example, you can:

a. Run one ad six times in one publication.

b. Run six ads one time in different publications.

continued on next page



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Editorial (Cont.)

c. **Run one ad, backed up by a fancy promotional mailer.**

d. **Send demo copies of your software to dealers.**

e. **Buy a mailing list and use direct mail advertising.**

And the list of alternatives goes on and on. As a general rule, there are **always** alternatives. Consider them. Massage them. Look for results. And put away your preconceptions.

THE PRICE OF BEING WRONG

There's nothing wrong with **experimenting** with new ideas. A controlled experiment will give you direct experience with the scenario that you've picked.

Even better . . . if you can **contain** each experiment within a fairly small budget, then you can run **multiple experiments** and **select the best ones**. It's like planting a garden. You can sow a number of seeds and then select the strongest seedlings to fertilize and care for.

Make a cardinal rule that "**Being Wrong should not put your Business At Risk**." Don't let the cost of being wrong be so great that it destroys your business.

Set time limits. Your scenarios should try to define **criteria** for success or failure, **in advance** and should put the evaluation/selection on a **time-schedule**.

These principles can be applied to almost all kinds of anticipated change:

Hiring a new employee.

Making a Price Change.

Changing documentation.

Setting a promotional campaign.

Selecting a new product for your line.

Setting Service Policies.

Organization Change.

etc.

You can make Change an Ally. If you **don't** make it an Ally, it will **automatically** become an Enemy.

This issue leads off with an exciting complement to Applesoft. **Paul Irwin's Amp-L-Soft** will add all sorts of useful functions to your programs using our old friend, the Ampersand.

Preston Black and **Richard Morris** have joined forces to bring you a statistics-based, realistic simulation of big league football with **Apple Bowl Football!**

Rudy Guy is back with an **Electronic Message Center**. Bring Airport methods to your home and office for "passing the word."

Bill Fortenberry's Graphics Workshop features THE SHAPE, a program for actually creating and recalling Shape Tables for your own programs.

Sandy Mossberg's PARSE once again takes you inside of the Monitor for a tour of its Parsing methods.

With Tips 'N Techniques, Utilities, Legal Bits, and other features, you're sure to have fun with this issue. Enjoy!

Mike Harvey
Publisher/Editor

LETTERS

Dear Mike,

In a letter by Ian Hendrie in Nibble, Vol. 3, No. 4, he claims there is a design flaw in the **Line Cruncher** by not checking for GOTO's. On the surface this might appear so, but actually this was design consideration and purposely omitted. If a line after a GOTO is referenced, it is not combined with the GOTO. However, if the line is not referenced, the code is combined, which doesn't change the execution. The only way a line after a GOTO can be executed is if it is referenced. So there is no need for the correction given in his letter. However, in the case of an IF-GOTO statement, the patch given by Michael J. Leggett in Nibble, Vol. 3, No. 3 should still be done.

But Hendrie's letter does bring up a good point. If after "crunching" a program you see code after a GOTO, you know that code is useless and can be deleted.

Arthur S. Bickel also sent in a patch in the same issue to take care of the problem when users leave off the last quote in a PRINT statement. We received a letter from another reader about two weeks ago with the same situation. We never realized that syntax gave no errors. Just today we sent out a patch to the other reader. We wish we had Bickel's patch earlier, because it would've saved us the time writing our own. (By the way, this correction was very well done.)

It would be much appreciated by authors if readers sent us a copy of a program fix in addition to sending NIBBLE one. Otherwise, we hear about it the same time and way everyone else does — by reading it in the magazine. (Authors are always the last to know.)

Alan and Valerie Floeter
The Software Experience
Milwaukee, WI

Dear Mike,

I really enjoyed the article by Cornelis Bongers entitled **Quick Sort** in the Vol. 3, Number 4 issue. It does indeed sort much quicker than any machine language routine I had run across previously. I do believe that there is a possible error in the program if you plan to use it with string arrays. The same error appeared in the excellent Amper Interpreter article some time ago. It involves setting the **FRETOP** pointers anytime you set the **HIMEM** pointers. If **HIMEM** is reset without resetting **FRETOP**, then strings used in Applesoft programs can overwrite the machine code. This can be corrected by executing a **"clear"** command in Basic after running Quick Sort or by adding a **"STA $6F"** after the **STA HIM** and a **"STA $70"** after the **STA HIM+1** in the assembly language listing. Thanks to Nibble and C. Bongers for another fine article. (And thanks to R.M. Mottola for the Amper-Interpreter fixes which I remembered to fix this.)

John Haver
Indianapolis, IN

ED. NOTE: *You can perform the same function in a BASIC program by executing the following statement directly after BRUNning Quicksort:* **HIMEM:33216**. *Remember that you should* **BRUN QUICKSORT** *at the very beginning of your program, before using or defining variables.*

Dear Mike,

The following program line changes should make the requested changes to "keyboard" control of Apple Slugger as requested by your reader Neal C. Brick.

```
7380 XA=5:J=PEEK(-16384):POKE-16368,0
7385 J$=CHR$(X):IF J$="<" THEN XA=-5

7390 SAME AS
7395 ABOVE
```

Note: USE < or > to move the fielder.

```
7105 J=PEEK(-16384):POKE-16368,0:
     J$=CHR$(J)
7110 IF J$="S" THEN RETURN
```

Note: Use "S" to swing the bat.

```
7500 J=PEEK(-16384):POKE-16368,0:
     J$=CHR$(J):IF J$="P" THEN RETURN
7510 GOTO 7500

7550 SAME AS
7560 ABOVE
```

Note: Use "P" to pitch the ball.

Dear Mike,

The letter in your latest issue (Vol. 3/No. 4) from Joseph Feehan giving an update for his NFL RANKER will not work as printed. The following line changes should be made:

```
20 DIM RANK(28,3)
30 FOR I = 1 TO 28:FOR J = 1 TO 3
170 PRINT D$;"CLOSE NFL.DATA"
```

Keep up the good work, you've got an excellent product.

Dave Savage
Broomfield, CO

MICRO-CALC (V3 #4): Line 280 should be:

```
280 IF A$ = CHR$ (8) THEN VTAB 3: HTAB 1:
  PRINT WO$:: INVERSE : VTAB 4 + I:
  HTAB 1: PRINT WO$;: NORMAL :B$= " ":
  GOSUB 380:B$ = "": GOTO 260
```

Dear Mike,

The **CATSUP** program (Vol. 2 #7) contained a minor oversight that I thought you might like to make your readers aware of. It seems that Chuck Weber created his own IOB on page 3 (perfectly acceptable). The problem occurs if you try to BLOAD an assembly routine to page 3 (quite common). You end up writing over top of the IOB and strange things happen. The solution is to reset the IOB pointers to where DOS normally expects them prior to a LOAD or BLOAD. The following 2 lines do this, and they also end the program after a BLOAD, rather than branch to a non-existent line number.

```
1185 IF K$="1" THEN POKE 769,183:
     POKE 771,232: CALL 768
1200 IF LEFT$(A$,1)="B" THEN END
```

Larry Houston
Peru, IN

TRAC Plus in Nibble Express Volume 2

Line 3053 should read:
3053 GOSUB 280:GOTO 3050

This corrects an error in the command data entry error trapping.

continued on next page

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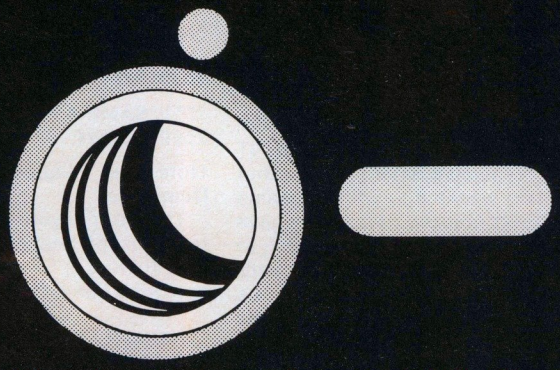

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Letters (Cont.)

ED. NOTE: *When we publish machine language utilities, we often try to assemble them to run just below the upper memory boundary. One reader who was experiencing a problem discovered that when he increased the MAXFILES to* **four**, *the machine language was* **overwritten**.

The MAXFILES instruction establishes the number of Disk Input/Output buffers. The standard number of I/O buffers (default value) is 3. Setting up 4 buffers moves HIMEM downward and can destroy a resident machine language program which occupies those memory positions.

The general solution is to BLOAD the program to a lower memory position and then to manually change the **absolute** *branching addresses to the new block of memory. Another is to relocate the machine language program* **between** *DOS and its buffers, as was done by Joel Buckley in DOS 3+2, Nibble Volume 3 #3.*

Alternatively, one can enter the source code with the appropriate assembler and then ORG the program to a lower memory position.

For most programs, this phenomenon will not be a problem. Simply be aware that if you are getting unexplainable crashes on a machine language program which occupies memory from $9200 upward, a MAXFILES 4, may be the cause.

Dear Mike,

Applesoft Variable Cruncher was published in the Vol. 3, No. 4 issue of Nibble. **The first mistake is the BSAVE length: it is stated as $370, but should be $372 according to the assembler listing.** The second point is the program's handling of variables. Although the program works as stated, it does not do all that it can to shorten variable names to one character names. The Applesoft interpreter recognizes subscripted variables (arrays), functions and simple variables as distinct types. In other words, the variable A, the function FN AB(X), and the array A(20) are treated as distinct variable names. The same is true for string and integer arrays. However, if all of the single character real variable names are used, Mr. Floeter's program would not shorten AB(20) even though it could. This is no big deal, but it would be nice to have the program do this.

To avoid reassembling the program if you only want to execute phases 1 and 2, make the following changes to the object code. Go into the monitor and type 6079:74 60 74 60. If you want phases 1, 2 and 3, just type 607B: 74 60. These changes cause phases 3 and 4 to jump to an RTS instruction at location $6074, thereby avoiding the wasted time taken to perform phase 2 two extra times or to perform phase 3 an extra time.

I wish to thank Mr. Floeter for a fine program. Keep up the good work.

Steve Mueller
Franklin, MI

Dear Mike,

After using Gary Little's program in Apple Tricks (Vol. 2 No. 5), Trapping the Reset key, I have made a few vital modifications.

First, the adjustment of the power up byte could have been made easier by jumping to $FB6F. This automatically changes the value of the power up byte (see page 37 of the Apple II Reference Manual).

Second, the routine which corrects the ONERR bug is incorrect. It should read **$DF** instead of **$D6** (though he has the correct value on the previous page).

Third, the SOFTER pointers, **$3F2** and **$3F3**, should be changed to their original values. They must contain the address of the reentry point for whatever language is in use (again page 37). And the power up byte should be recalculated.

```
0300-  A9  10      LDA  #$10
0302-  8D  F2  03  STA  $03F2
0305-  A9  03      LDA  #$03
0307-  8D  F3  03  STA  $03F3
030A-  20  6F  FB  JSR  $FB6F
030D-  49  A5      EOR  #$A5
030F-  60          RTS
0310-  68          PLA
0311-  A8          TAY
0312-  68          PLA
0313-  A6  DF      LDX  $DF
0315-  9A          TXS
0316-  48          PHA
0317-  98          TYA
0318-  48          PHA
0319-  A9  03      LDA  #$03
031B-  8D  F2  03  STA  $03F2
031E-  A9  E0      LDA  #$E0
0320-  8D  F3  03  STA  $03F3
0323-  20  6F  FB  JSR  $FB6F
0326-  20  EA  03  JSR  $03EA
0329-  4C  12  D4  JMP  $D412
032C-  00          BRK
```

These changes should correct the problem of hitting reset, after the program is run, and getting a shortened error message (usually next w/o for, or return w/o gosub).

And thanks for making such a fine computer magazine. I am a 16 year-old computer student and I have found your magazine the *most* important publication for young Apple users.

Christopher Anderson
Mankato, MN

ED. NOTE: *Michael Sullivan of Brooklyn, NY wrote to point out that while MLE works perfectly (NIBBLE Vol. 3 No. 2), it can develop problems if you try to use it with PLE (Program Line Editor) installed at the same time. DOS sets* **HIMEM** *at* **$9600** *(Hex). PLE moves HIMEM down to* **$9000**. *If you try to enter a program which uses memory* **higher than $9000**, *the machine language program will be zapped by the DOS buffers which have been shifted by PLE. To overcome this, simply* **avoid making PLE coresident with MLE in entering machine language programs above $9000**.

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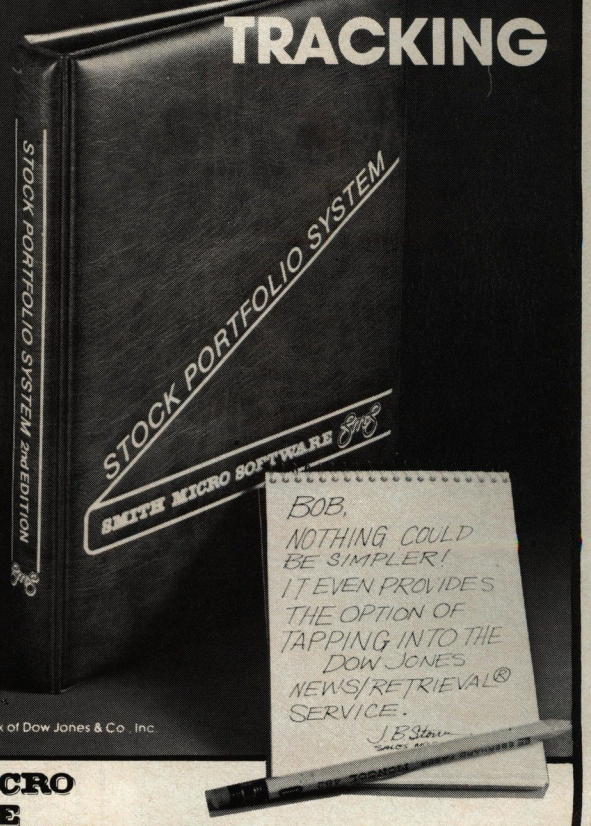

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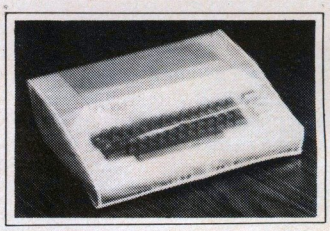

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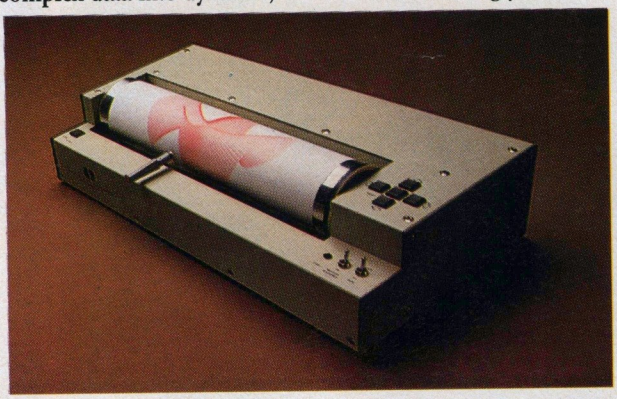

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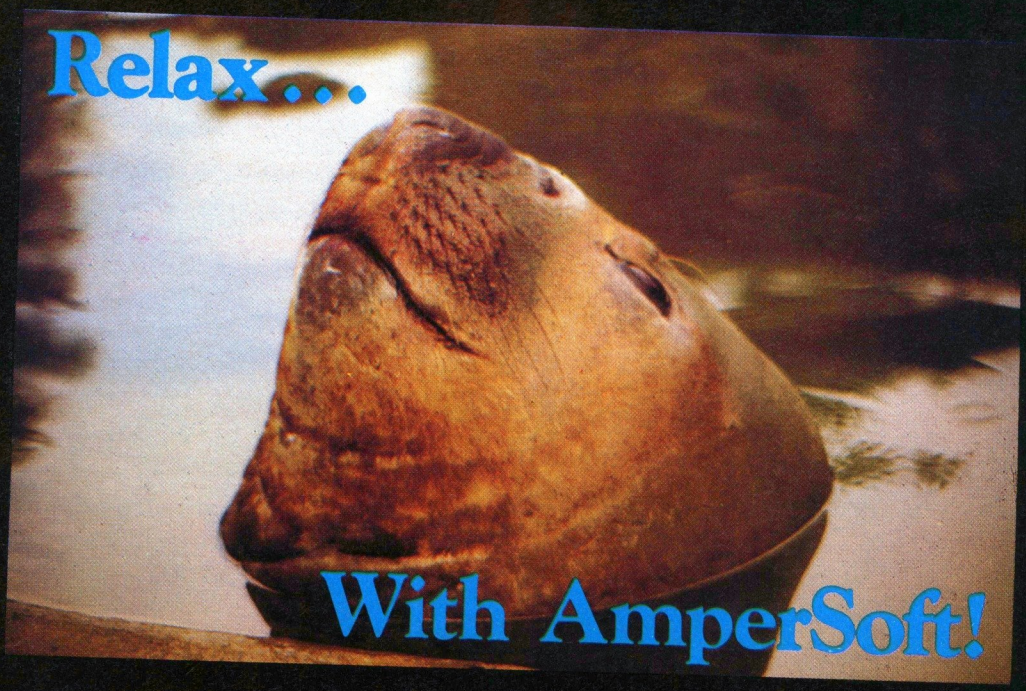

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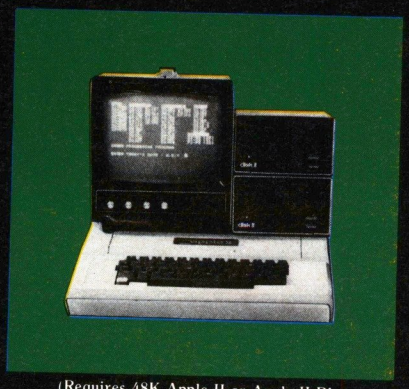

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Key Perfect 4.0 and Apple Checker 3.0 Tables

Key Perfect and Apple Checker tables are presented here to help you verify the entry of Nibble programs. Using Key Perfect or Apple Checker after you have keyed in one of our programs should result in tables identical to the ones shown here. If they do not match, then you have made a typing error and should closely examine your keyed-in program. Key Perfect 4.0, which points out the portion of your program that contains the typing error, is available from Micro-Sparc Systems Division — see the ad elsewhere in this issue. If you purchased Key Perfect prior to 6/01/82, then you may receive a free update to version 4.0 by returning your disk to Micro-SPARC. The tables shown here were created using the updated version.

The Apple Checker table shown here was generated using Apple Checker 3.0, presented in Volume 3, No. 4. NOTE: All Binary Files must be BLOADed at $B00 (e.g. BLOAD QUICK-SORT, A$B00) before using Apple Checker 3.0.

continued on next page

NOTE: KEY PERFECT and CHECKER values for AMP-L-SOFT were generated using the final merged AMP-L-SOFT program.

KEY PERFECT 4.0
RUN ON
AMP-L-SOFT

CODE	ADDR# - ADDR#
26E8	4750 - 479F
2A85	47A0 - 47EF
22A9	47F0 - 483F
2AEF	4840 - 488F
2858	4890 - 48DF
2B00	48E0 - 492F
2826	4930 - 497F
2DA4	4980 - 49CF
2931	49D0 - 4A1F
2A06	4A20 - 4A6F
256A	4A70 - 4ABF
278E	4AC0 - 4B0F
26DC	4B10 - 4B5F
2BB4	4B60 - 4BAF
287B	4BB0 - 4BFF
2633	4C00 - 4C4F
26FD	4C50 - 4C9F
29E5	4CA0 - 4CEF
254A	4CF0 - 4D3F
00	4D40 - 4D8F
00	4D90 - 4DDF
00	4DE0 - 4E2F
00	4E30 - 4E4D

TOTAL PROGRAM CHECK IS : 06FE

KEY PERFECT 4.0
RUN ON
EMC

CODE	LINE# - LINE#
87C9	10 - 120
CCB6	130 - 220
97BB	230 - 1070
74F4	1080 - 1170
7499	1180 - 2010
9A69	2020 - 2110
8755	2120 - 3080
0104FB	3090 - 4010
7159	4020 - 4110
61F6	4120 - 4210
AFE1	4220 - 4310
60F5	4320 - 5000
8FD6	5010 - 5100
9373	5110 - 6030
4261	6040 - 6130
4D01	6140 - 8040
6600	8050 - 9060
5BF8	9070 - 10030
86DF	10040 - 10130
A66D	10140 - 15050
83B4	15060 - 32080
37F7	32090 - 32120

TOTAL PROGRAM CHECK IS : 184E

APPLE CHECKER 3.0 TABLE

PROGRAM NAME	FILE TYPE	LENGTH	CHECKSUM
AMP-L-SOFT	B	06FE	90
EMC	A	15F4	C8
APPLE BOWL FOOTBALL	A	4182	33
CHARACTERS	B	078A	D8
SHIP SHOOT	A	09CB	44
THE SHAPE	A	190E	23

KEY PERFECT 4.0
RUN ON
APPLE BOWL FOOTBALL

CODE	LINE# - LINE#
5898	10 - 100
015872	110 - 200
5395	210 - 300
A4B3	310 - 400
72C5	410 - 500
BB32	510 - 600
542A	610 - 700
4C77	710 - 800
9B93	810 - 900
5AFE	910 - 1000
7928	1010 - 1100
9749	1110 - 1200
C37F	1210 - 1300
63C7	1310 - 1400
AF23	1410 - 1500
E79C	1510 - 1600
85FB	1610 - 1700
80AD	1710 - 1800
937D	1810 - 1900
8874	1910 - 2000
6DAD	2010 - 2100
7932	2110 - 2200
AEC3	2210 - 2300
A991	2310 - 2400
49B5	2410 - 2500
811E	2510 - 2600
86D7	2610 - 2700
E0B1	2710 - 2800
BC37	2810 - 2900
7BE3	2910 - 3000
4E4B	3010 - 3100
9FAD	3110 - 3200
ABB8	3210 - 3300
7053	3310 - 3400
D14E	3410 - 3500
D72E	3510 - 3600
B2EA	3610 - 3700
633F	3710 - 3800
E041	3810 - 3900
92A7	3910 - 4000
C38F	4010 - 4100
9180	4110 - 4200
E9CB	4210 - 4300
F165	4310 - 4400
C196	4410 - 4500
EC7F	4510 - 4600
B38E	4610 - 4700
B9F8	4710 - 4800
016DDD	4810 - 4900
014C11	4910 - 5000
E1ED	5010 - 5100
893D	5110 - 5160

TOTAL PROGRAM CHECK IS : 47BB

KEY PERFECT 4.0
RUN ON
SHIP SHOOT

CODE	LINE# - LINE#
4FB9	10 - 30
A5B0	40 - 130
B230	140 - 230
5B1E	240 - 330
4730	340 - 430
4A44	440 - 530
7564	540 - 630
5CB6	640 - 730
59DF	740 - 830
5681	840 - 930
57C0	940 - 1030
95CC	1040 - 1130
0D6B	1140 - 1150

TOTAL PROGRAM CHECK IS : 0B45

KEY PERFECT 4.0
RUN ON
THE SHAPE

CODE	LINE# - LINE#
74EC	10 - 100
B0B8	110 - 200
5DC7	210 - 300
523B	310 - 400
60F8	410 - 500
3F97	510 - 600
39EE	610 - 700
447A	710 - 800
39B4	810 - 900
3DA3	910 - 1000
6223	1010 - 1100
4AF1	1110 - 1200
4A38	1210 - 1300
5027	1310 - 1400
686C	1410 - 1500
53DE	1510 - 1600
3F00	1610 - 1700
4792	1710 - 1800
92C5	1810 - 1900
4105	1910 - 2000
5987	2010 - 2100
5E5B	2110 - 2200
6E1F	2210 - 2300
3164	2310 - 2400
90C7	2410 - 2500
329A	2510 - 2600
7A55	2610 - 2700
8CAD	2710 - 2800
62C4	2810 - 2900
7BE9	2910 - 3000
F6BC	3010 - 3100
0172FC	3110 - 8275
0CD6	21317 - 21317

TOTAL PROGRAM CHECK IS : 1CD0

KEY PERFECT 4.0
RUN ON
CHARACTERS

CODE	ADDR# - ADDR#
28D7	4750 - 479F
285F	47A0 - 47EF
270E	47F0 - 483F
27C0	4840 - 488F
2847	4890 - 48DF
2594	48E0 - 492F
29AF	4930 - 497F
2822	4980 - 49CF
27D8	49D0 - 4A1F
2869	4A20 - 4A6F
28D2	4A70 - 4ABF
2623	4AC0 - 4B0F
28A2	4B10 - 4B5F
2A75	4B60 - 4BAF
23B0	4BB0 - 4BFF
2B6B	4C00 - 4C4F
2FB2	4C50 - 4C9F
2AC1	4CA0 - 4CEF
2770	4CF0 - 4D3F
271E	4D40 - 4D8F
27A6	4D90 - 4DDF
3056	4DE0 - 4E2F
2D13	4E30 - 4E7F
277C	4E80 - 4ECF
067D	4ED0 - 4ED9

TOTAL PROGRAM CHECK IS : 078A

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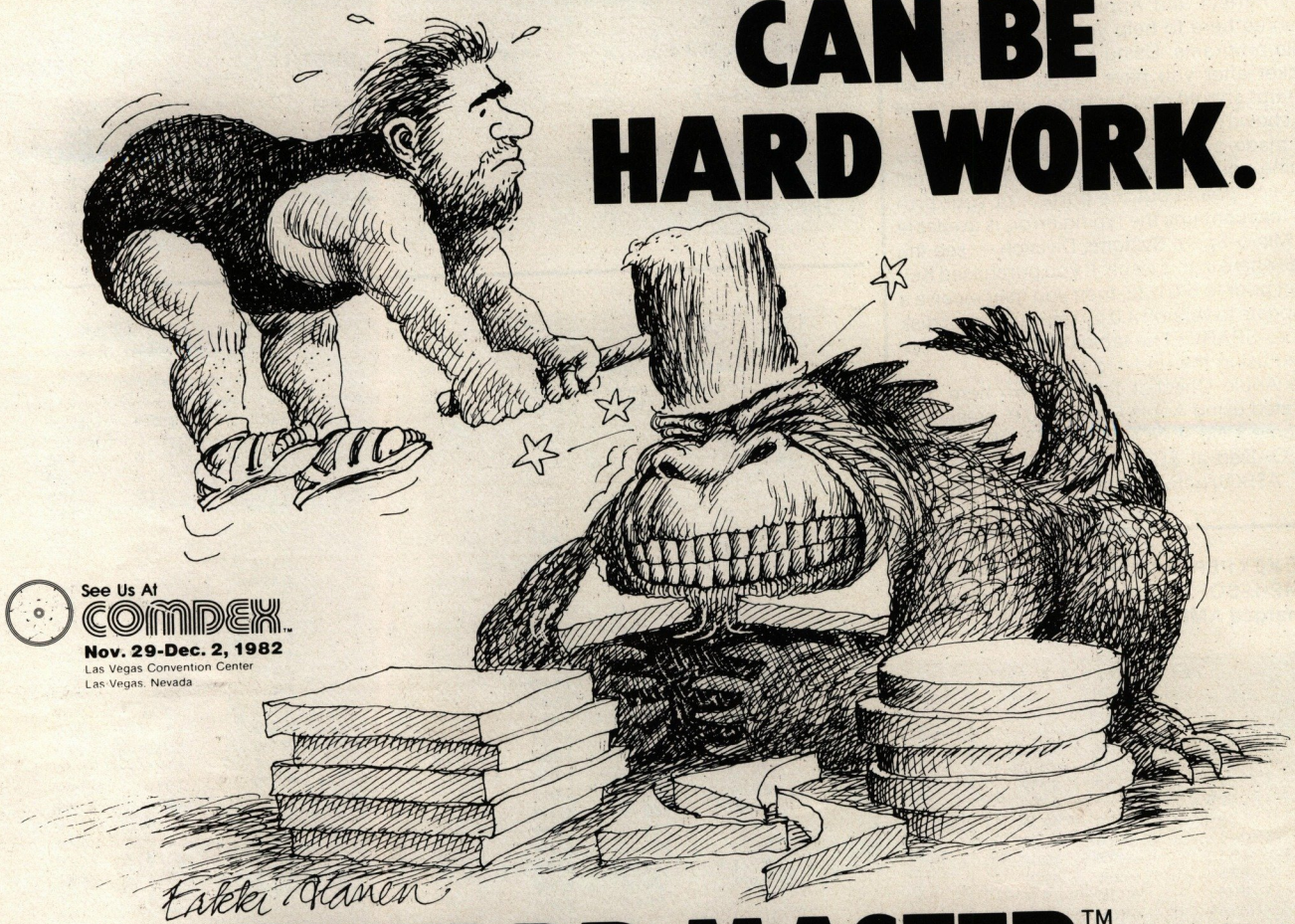

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Key Perfect Tables

ED. NOTE

In using Apple Checker and Key Perfect, it is important to be alert to several kinds of Assembly Language Statements which:

1. **Reserve memory locations for use** by a published program . . . but . . .
2. **Do not physically put data into memory.**

Examples of such statements are: **DS** and **DFS**. Here, for example, is how a program might look with a series of DFS (or DS) statements using the Nibble M.L.E. program (Vol. 3 #2 page 21):

```
436B  60    459          RTS
436C        460  *
436C        461  * VAR
436C        462  ENDADR  DFS  $2
436E        463  IMADD   DFS  $2
```

Notice the **Hex $60** is stored in memory location **$436B**. This increases the memory counter to hex **$436C**.

On **line 462**, there is a **DFS** instruction which **reserves a 2-byte memory location** and gives it the label **ENDADR**. **This increases the memory counter by two positions to $436E, but does not put any data into memory locations $436C and $436D.**

The same thing happens on **line 463** where another 2-byte memory location is reserved and labelled **IMADD**. Again, the memory counter is increased by two positions, but **no data is put into memory** at this point.

If no data is physically forced into memory, the Key Perfect or Checker Tables will be generated with whatever happened to be in memory and there will be inconsistent results.

****Important**** Nibble will **force zero entries** into **DS** and **DFS reserved memory locations** prior to preparing Key Perfect and Checker Tables in order to assure consistent checksums.

In order to assure compatibility with the Checksums, you should plan to make a note of the occurrences of **DS** and **DFS** statements. Then you can force zero entries into those locations by entering the Monitor (by typing **CALL-151**) and **directly entering zeros into those locations**. In the example above, you would:

Type **CALL -151** (to enter the Monitor)

Type **436C:00 00 00 00** (to fill the reserved areas with zeros)

Then you can BSAVE the program and then successfully run Key Perfect or Apple Checker against it for a consistent and accurate comparison with the published tables.

Alternatively, **with Key Perfect only**, you can simply ignore the block of memory which covers the DFS or DS statements (since their contents will not affect the operation of a program), and concentrate on the comparison of those memory locations which contain actual program code.

How to Enter Assembly/ Machine Language Programs in Nibble

To use Machine Language programs in this issue, first enter the Apple Monitor by typing **CALL -151**. At this point an **asterisk (*)** should appear on your screen.

Now, when you look at an Assembler Listing in the magazine, remember first that the Apple **Disassembler does not produce assembly listings such as those shown in the magazine**.

Typically, the assembler listings used in Nibble are produced by commercially available Assembler programs. In these listings, the first **numbers/characters** on the **left margin** are the memory locations of each machine language statement. An example is: **0300:A9 FF**. In this example, the **0300** is the memory location of the machine language statement.

The second grouping of **numbers/characters** is the machine code for each statement in memory. In this example:

```
0300-A9 01
0302-8D 00 0A
0305-AD 00 0A
0308-20 A8 FC
030B-20 E4 FB
030E-4C 05 03
```

The **A9 01 8D 00 0A** etc. is the actual machine code.

These two groupings may be separated by either a colon (:) or a dash (-) **in the listing**. It is very important, in typing in the machine code, to do three things:

1. **Separate the Memory Location from the first pair of Machine Code characters with a colon (:)**, regardless of the symbol used in the assembly listing.
2. **Immediately follow the colon with the first pair of Machine Code characters without an intervening space.**
3. **Then type a space and the second pair of characters, a space** and then the **third pair of characters** and so on.

You can use this method to type in up to **85 consecutive pairs** of machine code instructions without having to type in a new memory location address. Using the example above, you could type in:

```
0300:A9 01 8D 00 0A AD 00 0A <Return>
0308:20 A8 FC 20 E4 FB <Return>
030E:4C 05 03 <Return>
```

When you approach a large number (LESS THAN 85) of **pairs** of **machine code characters**, you can press **RETURN** to store them in memory. Then begin again with the **memory location address** which follows the **last** pair of **machine code characters** you typed in . . . followed by a **colon** . . . and continue entering the Hex code until the program is completely entered into memory.

Once the program has been entered, type **CTRL C** to re-enter Basic. Then save the program on disk by typing in a BSAVE command which is appropriate to the published program. In the example, the command is:

BSAVE BUZZ, A$300, L$11 <Return>

You will be given the **values** which follow the **A$** and the **L$** (starting Memory **Address** and program **Length**) **in each article** which contains an assembly/machine language program.

Then you can run it by typing the following command:

BRUN BUZZ <Return>

To summarize, you can enter the entire machine language program by typing in the **first two sets of characters** from an assembler listing. They are:

Memory Location

followed by

: (colon)

followed by

Pairs of Machine Language characters

Finally, you can re-enter Basic by typing CTRL C and then use the BSAVE instruction to save the program. For more information on entering machine language instructions into memory, see the Apple Reference Manual, page 44.

P.S. You might try exercising the example above. It is a small machine language program for sounding your Apple's buzzer. You can run it by saving it to disk and then typing BRUN BUZZ as shown above.

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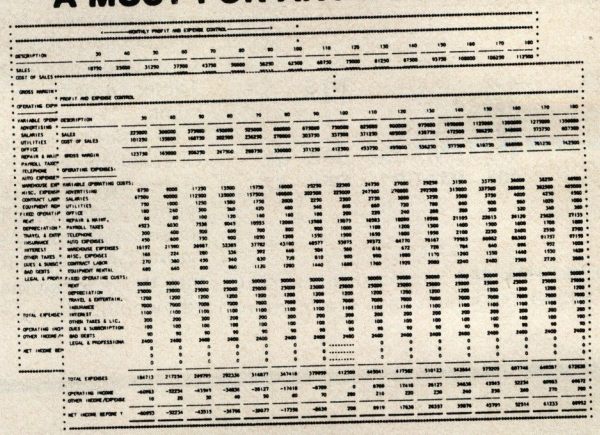

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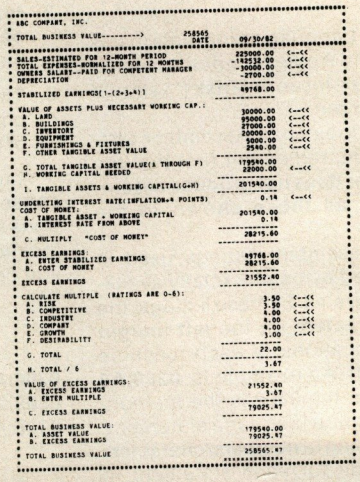

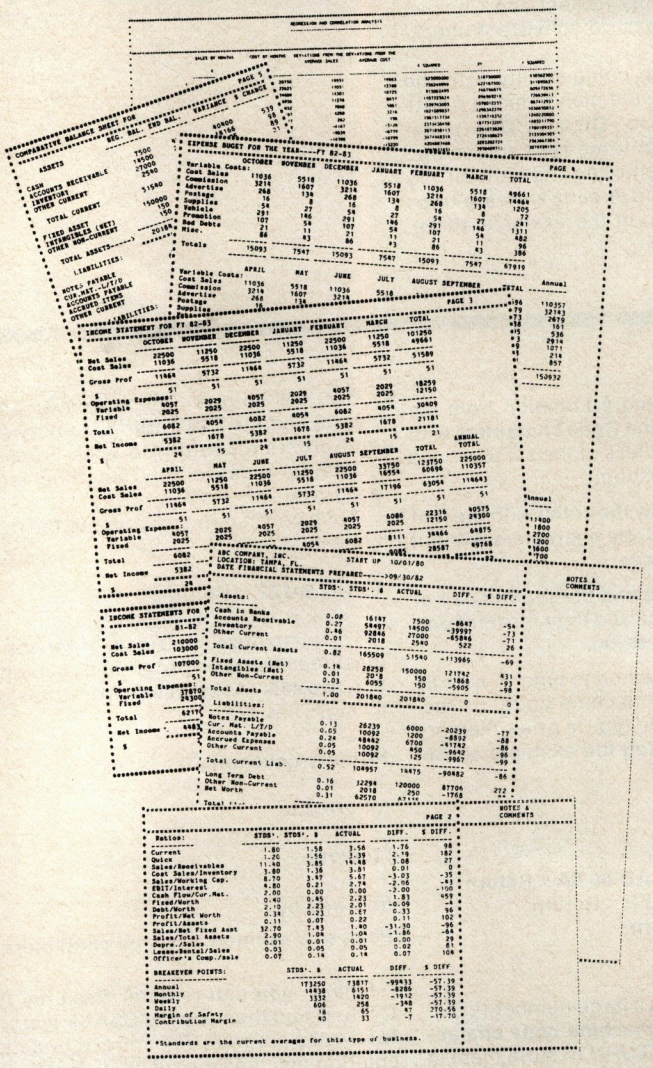

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Amp-L-Soft

Amp-L-Soft

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Have you ever wished that Applesoft had a few choice commands to make your programming easier? Like a tone generator, or an INPUT that lets you enter commas, or a fast substring search? And while we're at it, why not have an easier way to call system routines in the Monitor or DOS? The program should be just as easy to use as Tag Sort (Nibble Vol. 2 #6); in fact we want Tag Sort to be included.

Well, you can have it working for you on your own Apple II so read on!

To use Amp-L-Soft, you need an Apple II with at least 32K, Applesoft in ROM (a RAM card with FPBASIC is great!), and a disk drive.

HOW TO USE Amp-L-Soft

The entire package comes in a binary file called Amp-L-Soft. From the keyboard, you can type BRUN Amp-L-Soft. From a program, you need three statements:

```
10 DEF FN AD(X) = PEEK(X) +
   256*PEEK(X+1)
50 PRINT CHR$(4); "BLOAD AMP-L-SOFT"
60 CALL FN AD(FN AD(999)-79)
```

Be sure you load and call Amp-L-Soft before any DIMension statements. Do it at the beginning of the program, or better yet, in the HELLO program.

If you want to remove Amp-L-Soft from your memory and reclaim its space, then use the **FP** command.

When you load and run this package, it is located at **$4750** where it can keep below the DOS of a 32K system. Amp-L-Soft relocates itself forward in memory if you have a 48K system, and then moves its routines to **$80C** and sets the ampersand hook at **$3F5.3F7**.

You can use any of the ampersand routines present by a simple statement from Applesoft. You always use the same form:

&x(parameter list)

where **x** is the letter code for the routine:

TAGSORT... &A(S$, T%, F, L)
SUBSTRING... &B(A$, B$, P%)
SYSCALL... &C(A, X, Y, R, C%)
INPUT... &I(IN$)
TONE... &N(P, D)

Currently, you have **A, B, C, I,** and **N** defined for your use. Just give each routine the parameters it needs, and it will do what you want.

Any **parameter** you give a routine is one of three kinds. If it is a **value**, you can give it any legal Applesoft expression like **5** or **FN L0(C1)**. If it is a **variable**, then you can give it either a simple variable like **A$** or **C%**, or else an array variable like **T%(5)** or **D(34, 2)**. But, if it is an **array name**, then just give it **A$**, say, for an array DIMensioned as **A$(N)**. Keep values within the ranges given. With variables, use only the type shown: **integer**, **real**, or **string**. You can use any routine by passing it the parameters — values, variables, and names — it requires.

HOW TO LOAD Amp-L-Soft

Amp-L-Soft is made up of 2 assembly language program segments and 1 Basic program called BOOTER. If you are entering the machine language directly into memory, here's how to **a) Enter and Save each segment;** and **b) Merge the two segments into the final program.**

The entry of each program segment is begun by typing: **CALL-151** to enter the Monitor. At that point, the screen will display an **asterisk (*)**.

Now **look for the first place in the program where machine code appears** in the second/third/fourth columns immediately following the colon. For example, in **LOADER**, the machine code begins at memory location **$4750 (hex)** with the codes **A9 0F**, and continues with **85 51 A9 00** etc.

Now, **type in the starting memory address** of the code; in the example, this is memory address **$4750 (hex)**. Now you can begin entering the code by typing:

4750:A9 0F 85 51 A9 00 85 50 A5 67 etc.

For additional information on how to enter machine language code, refer to the instructions on the Letters page of this issue.

When you have finished typing in the code, you can save it to disk with the following command:

BSAVE LOADER, A$4750, L$AC

In like fashion, enter the other segment and save it with the command:

BSAVE AMP-L-SOFT UTILITIES, A$80C, L$642

Now, you can **Merge** the program segments with the following steps. They're a little complicated so please follow them exactly. With the two routines now stored on disk, type:

BLOAD LOADER, A$4750
BLOAD AMP-L-SOFT UTILITIES, A$480C

Now, all the routines are merged in memory and must be saved as a block. This can be done with the command:

BSAVE AMP-L-SOFT, A$4750, L$6FE

It is this last program, Amp-L-Soft, which will be operational when you run the Applesoft Basic Loader called BOOTER. It is this program which you would transfer to other disks in order to build turn-key applications.

For the moment, let Amp-L-Soft stay comfortably on the disk while you type in the Applesoft BOOTER program (Listing #1). This program loads Amp-L-Soft, relocates it to lower memory, and then sets up the Applesoft Pointers to accept your own programs. It is suggested that this Booter program be made the HELLO program on any disk which you wish to use for automatically loading Amp-L-Soft.

Having typed in **BOOTER**, now save it on disk.

Now you can run **BOOTER** and it will set everything up to try out the program with the Amp-L-Soft demonstration (Listing #2).

Let's look at each of these routines and see what you can do with them.

SYSCALL

How often have you seen a routine in Monitor, Applesoft, or DOS and wished you could have used it without having to program the machine language needed to call it? For instance, to print a number in hex, the monitor has a couple of neat routines, but you have to load the byte you wish to convert into the A-register first. But you couldn't do that from Applesoft, so you had to do some tricky programming.

A good trick is to have one **calling routine** written in machine language to **load the registers, make the system call**, and then return the carry flag to your Applesoft program. Why the carry flag? Because some system calls will tell you if an error occurred or not by using the carry flag. A famous example of this is **RWTS** in the heart of DOS. **By having a call routine like this, you can use many of the system calls that are unavailable from Applesoft.**

A syscall routine can load the A-register, the **X-register**, and the **Y-register** with the values passed to it from your Applesoft program; then **call the memory address** you also passed to it from the Applesoft program; and finally **pass the carry flag** back to your program. So, when using **SYSCALL**, you give it five parameters: **A-reg, X-reg, Y-reg, call address**, and the **carry flag**. The first four are values, so any Applesoft expression can be used. But the fifth parameter — the carry flag — must always be an integer variable. As an example, here's how you can **print a hex number**:

&C(127, 0, 0, 64986, C%)

This prints **7F** — the hex equivalent of **127** — for you. In this example, the **A-reg** was set to **127**, the **X-reg** to **zero**, the **Y-reg** to **zero**, and the call address was set to **64986** in the Monitor. The integer variable — C% here — must always be provided to capture the carry flag, regardless.

You can see a number of **SYSCALL sequences** in **Table 1**. Most of the routines are in the Monitor, but the RWTS sequence is in DOS, and the three bit handling routines are included with SYSCALL.

These are the three little routines we call **Little Bit Pickers**. Whenever you want to get just one bit from a byte, or put one bit into a byte, these are the calls to make. The first one **reads a bit** from a byte into an integer variable and the other two **write a bit** into a byte. Now you can work quickly and easily with the **track bit maps** in DOS, or the most significant bit —bit 7 — of character bytes. The bit handling that we found so awkward from Applesoft is

continued on next page

Amp-L-Soft (Cont.)

now much easier with SYSCALLs to the Little Bit Pickers. See the program **AMP-L-SOFT DEMO 2** for some examples of their use.

Use SYSCALL whenever you want to call a routine that passes parameters via the 6502 registers. Set the A-reg, the X-reg, the Y-reg, and the call address. Always provide an integer variable to capture the carry flag. Use the Little Bit Pickers to get and put bits of a byte according to the examples in **Table 1**.

SUBSTRING

This is a function that **searches one string and tells you where a particular substring is located**. You can use it to **edit input strings** from disk files and keyboard, to **lookup code numbers**, and to **format output strings**. It doesn't do anything that the **MID$** function in a loop can't do, but with it you can do the job easier and faster.

Just give Amp-L-Soft three variables: **a string to be searched**, a **target substring**, and the integer position:

```
&B(OB$, TA$, I%)
```

The search starts from the position given in **I%**, usually **one**. When the target string **TA$** is first found in the object string **OB$**, the function returns to you with its position in **I%**. But, if the target string can't be found, the position **I%** is returned to you as **zero**.

For example:

```
I% = 1
A$ = "THE QUICK BROWN FOX JUMPED."
B$ = "O"
&B(A$, B$, I%)
PRINT I%
13
```

Now you can continue the search by entering a new starting value for I%.

```
I% = 14
&B(A$, B$, I%)
PRINT I%
18
```

And again

```
I% = 19
&B(A$, B$, I%)
PRINT I%
0
```

We start with the pointer at the first character of the string: **I% = 1**. The strings are given values: **A$** is the object of the search, and **$B** is the target. The target here is just one character — **"O"**. After the first call, you can see that the pointer is at the thirteenth character; we found **the first "O"** in **A$**. By changing **I%** from **13** to **14**, we continued the search. On the second call, we found that **the second "O"** is the **nineteenth** character. Again to continue, we increased **I%** by one — to **20**. On the third call, you can see that the pointer became zero because there is **no third "O"** in **A$**. Our search has ended.

So, **to start a search, set the pointer to one**. To continue the search, increment the pointer by one after each "hit". Whenever a search results in a zero pointer, the search is completed.

Table 1
SOME USEFUL SYSCALLS

Read bit from a byte:

```
BR = FN AD(FN AD(1014)+47)+72
B% = byte to read: 0. . . 255
N% = bit number: 7. . . 0 (0 = LSB)
&C(B%, N%, 0, BR, C%)
result (0 or 1) = C%
```

Turn ON bit in a byte:

```
BN = FN AD(FN AD(1014)+47)+77
B% = byte to be changed: 0. . . 255
N% = bit number: 7. . . 0 (0 = LSB)
POKE 60, B%
&C(0, N%, 0, BN, C%)
B% = PEEK(60)
```

Turn OFF bit in a byte:

```
BF = FN AD(FN AD(1014)+47)+87
B% = byte to be changed: 0. . . 255
N% = bit number: 7. . .0 (0 = LSB)
POKE 60, B%
&C(255,N%,0,BF,C%)
B% = PEEK(60)
```

Print a nybble in hex:

```
B% = nybble to print: 0. . . 15
&C(B%,0,0,64995,C%)
```

Print a byte in hex:

```
B% = byte to print: 0. . .255
&C(B%,0,0,64986,C%)
```

Print an address in hex:

```
B = address: 0. . . 65535
&C(FN HI(B),FN LO(B),0,63809,C%)
```

Print a number of spaces:

```
SP% = number of spaces: 0. . . 230
&C(0,SP%,0,63818,C%)
```

Print a character via COUT:

```
A$ = character to print, in ASCII
A = ASC(A$) + 128
&C(A,0,0,65005,C%)
```

Print a character to screen, via COUT1:

```
A$ = character to print, in ASCII
A = ASC(A$) + 128
&C(A,0,0,65008,C%)
```

Direct disk access:

This uses the work space in AMP-L-SOFT as a buffer, but remember it is clobbered by using TAGSORT. The Input-Output Block in DOS is used. The SYSCALL uses RWTS (DOS manual, p.94). Any error will set E% > 0 with the RWTS code.

```
WS = FN AD(1014)+1508
IB = FN AD(FN AD(999)):
        REM START OF IOB
POKE WS+B, X%:
        REM PUT any byte B: 0. . . 255
POKE IB+1, SL*16:
        REM SLOT: 1 . . . 6
POKE IB+2, DR:
        REM DRIVE: 1 or 2
POKE IB+3, V:
        REM VOLUME: 0  . . . 254
POKE IB+4, TR:
        REM TRACK: 0 . . . 34
POKE IB+5,SE:
        REM SECTOR: 0 . . . 15
POKE IB+8,FN LO(WS):
        REM BUFFER-lo
POKE IB+9,FN HI(WS):
        REM BUFFER-hi
POKE IB+12, OP:
        REM 1=read, 2=write, 4=format
&C(FN HI(IB),0,FN LO(IB),985,C%)
E%=0: IF C%>0 THEN
   E%=PEEK(IB+13)
X% = PEEK(WS+B):
        REM GET any byte B: 0. . . 255
```

The error codes of E% are:

0=	OK, no error.
16=	Write protected, can't write.
32=	Volume Mismatch: PEEK(IB+14) found.
64=	Drive error. Could be anything.
128=	Read error. Tried 48 times.

SUBSTRING APPLICATIONS

One place where SUBSTRING is very useful is in handling Menus. After you display the menu choices on the screen, GET each keystroke from the keyboard with a subroutine:

```
3100 C$ = "IJKMQ" : REM MENU CHOICES
3110 GET A$
3120 I%=1: &B(C$, A$, I%)
3130 IF I% = 0 THEN 3110
3140 IF I% = 5 THEN RETURN
3150 ON I% GOSUB 100, 200, 300, 400
3160 GOTO 3110
```

You could also use this for HIRES cursor control. For example, the four cursor keys could each call its own subroutine and the fifth choice — "Q" — will return to the caller.

In another example, when **editing input strings** from the keyboard or disk, you can use Amp-L-Soft to search for commands, keywords, or delimiters. For instance, you could write an Adventure game that lets the player enter English-language sentences and then parses them quickly (with SUBSTRING calls) to extract the valid commands.

The SUBSTRING also lets you do **fast character code conversion**. For example, you can make up a string in a code sequence, such as the "IJKMQ" sequence above. Now searching for a single ASCII character will return the code in the pointer. To convert back to ASCII from the code, just use the MID$ function. The **MID$ is the inverse of SUBSTRING**:

```
&B(OB$, TA$, P%) : REM GIVEN P%
TA$ = MID$(OB$, P%, L%) : REM GIVES TA$,
LENGTH L%
```

where **OB$** is the object string, **TA$** is the target string, and **P%** is the pointer. This makes the two functions an ideal match for your enciphering and deciphering needs.

The **SUBSTRING complements the MID$ function** in Applesoft. With the **MID$, you create a target string** by giving the object string and the pointers to the substring. But with **SUBSTRING, you find the pointer** to the substring by giving it the object string and the target string. The pointer must be in an **integer** variable and it must have a value of one for a complete search. The returned value of the pointer must be incremented by one to continue the search for more substrings. A returned pointer value of zero ends any search for substrings and indicates that none were found.

TONE

You can make many different sounds on the Apple II, many more than just the **CTRL/G** beep. If you have the so-called Red Book — the original Apple II Reference manual — then you probably know about Lutas' algorithm given on page 45. It uses two parameters — **period and duration** — to control the sound of a single tone. Now you can use Lutas' algorithm to make your own sounds simply by calling Amp-L-Soft's TONE routine:

&N(P, D)

where **P** is the **period** value and **D** is the **duration** value.

The **period** you give it must be a value from **zero to 255**. If you pick zero, then the Monitor WAIT routine will kill some time. Otherwise with a period greater than zero, you will hear a tone. Using a small period gives you a high-pitched tone, while using a large period gives you a low-pitched one.

You can control the **length** of the tone with the **duration**. Give it a value from **one to 255**: the longer the duration, the longer the tone. If you want a **rest note**, use a zero period with a suitable duration. You will find that any duration you give doesn't always give the same length of a rest as the length of a tone.

Experiment with different periods and durations. You can find sounds to use for special effects in **games**, **alarms**, and **tunes**. Use different tones for different prompts: a ready tone, an error tone, a warning tone, and an in-process (busy) tone. Play with some loops, some iterations, or anything else you can think of; discover new sounds! Put some personality into your programs!

INPUT

?EXTRA IGNORED. Look familiar? The string INPUT statement in Applesoft just won't accept commas, quotes, or colons. Do not enter them. They do not compute. Bah, humbug!

The routine that Applesoft uses to input a string is called **INLIN** and is located in Applesoft at **$D52C**. By calling this routine **directly**, we can get the input string **before** Applesoft edits it for delimiters — commas, quotes, or colons — and then assign the characters to the string variable ourselves. We have to create space for the string in memory and move it there from the input buffer. Then we can hook up the descriptors in the string variable. This way, we do just what Applesoft's string INPUT does, but without the extra unwanted editing.

Amp-L-Soft **INPUT** is easy to use. Just pass one string variable:

&I(IN$)

which is returned to you with the string from the system input. Because you are using the **system** input, it also **works with disk or any other device**, just the Applesoft's INPUT statement.

Now we can **INPUT** strings such as, **"THIS, IS GREAT FOR : TEXT ENTRY; ETC."** But why, you may ask, does Applesoft's INPUT behave in such a manner? What method can there be in this madness?

Well, Applesoft lets you enter **several** variables on one input line. You can write a statement such as:

100 INPUT A$, B, C$

and Applesoft uses the commas in the input buffer to tell it which variables go where. In this example, Applesoft expects only **two** commas (for three variables) in the buffer. The variable preceding the first comma is assigned to **A$**; the variable **between** the commas is assigned to **B** (with an implied VAL function); and the variable **after** the second comma is assigned to **C$**.

When Applesoft reads from disk for example, all the fields of a record can be assigned with a single INPUT statement. If you are learning about computers, this is a great way to work with the fields and records of files relatively painlessly.

With Amp-L-Soft's **INPUT** that allows commas, we can accept complete strings without the dreaded **?EXTRA IGNORED** message. Use Amp-L-Soft's INPUT routine for keyboard string inputs and complete record inputs from disk or other devices. Then just use Applesoft's INPUT statement for numeric input from the keyboard.

TAGSORT

Sooner or later, you'll need a good, fast sort. You may need to **sort a disk file**; to **search key fields** of a random access file, or just to properly **sequence an array** for fast lookup. When you do, you'll find that Amp-L-Soft's TAGSORT is a powerful solution for all these needs.

You can find a more complete description of TAGSORT in a companion article **Amper Jump & TSORT** (Nibble Vol. 2 #6). There, you can see how to call the sort and review the main ideas of its use. This version of TSORT has been enhanced to handle arrays which are larger than 800 elements (it is limited only by memory capacity of your Apple). It also properly sequences strings where the shorter string is identical to the same number of beginning characters in a longer string.

To sort a file or list, you must put the elements to be sorted into a **one-dimensional string array**. If it is a disk file that you are sorting, put only the **sort field** of each record into the string array. The array size is limited by the memory available, so if you find yourself running short of memory, pick up only enough characters (from the selected field) to do the job.

You will need a **second**, **one-dimensional array**, DIMensioned the **same size** as the string array. Make this second array an **integer** array, and load it with the **physical sequence numbers** of the records which you wish to sort. This integer array is your **Tag Array**. To initialize it, you put in the physical element numbers, (which usually range from one to the last element number, i.e.)

FOR I=1 TO N : T%(I) = I : NEXT

With disk files, you can use the **record numbers**.

After the sort is completed, you will have the physical record numbers in the final sorted sequence in the Tag Array. You can use these tags to access the records in the proper, sorted sequence. A tag array must be DIMensioned, regardless of whether you actually use it.

With the string and tag arrays loaded, you can sort whenever you wish, just by the call:

&A(S$, T%, F, L)

Give it the names of the arrays (**S$** and **T%**) as the first two parameters. Then give the value of the **first element** (**F**) you want sorted; usually **one**. Finally, give it the value of the **last element** (**L**) you want sorted; usually the number of records in the file or elements in the array.

After the sort, you'll find the string array in ascending (sorted) sequence. If you are working with a disk file, you can find the physical record numbers (in the same sort sequence as the strings) in the Tag Array. The first tag **contains the old record number** of the first record to write to the new (sorted) file; the second tag contains the number of the second record to write to the new file; and so on.

If you are working with a random access file, you can read the old records using random access tags, and then write the new file sequentially (in the new sorted sequence). Regardless of which data structure you are sorting however, you'll find that tags can often be used to speed things up.

HOW AMP-L-SOFT WORKS

JUMP

The heart of Amp-L-Soft is a routine called **JUMP**. When you load and call Amp-L-Soft, this routine together with the five working routines are loaded into the **$80C. EFF** area **below your program**. Whenever you use an **'&'**, this routine looks at your command code and finds the routine you requested. The **'&'** that you used tells Applesoft to pass control to memory location **$3F5**. At that location, there is a **JMP** instruction to **$81C** in **JUMP**. Depending on the code you used, one of the Amp-L-Soft routines is then selected for execution.

JUMP TO TONE

For instance, let's follow a call to the **TONE** routine. Suppose you type

& N(76, 224)

Applesoft sees your ampersand and jumps to **$3F5**. There, the instruction

JMP $81C

passes control to the **AMPER** routine in **JUMP**. If you look at the listing for **JUMP**, you will see that **it checks for a letter from Applesoft text**. The letter must be from **"A"** to **"Z"**, otherwise you get a ?SYNTAX ERROR message. We have an **"N"**, so it's OK. It does the same thing for an open bracket — **"("**. That's OK, too. Then it remembers the letter **"N"** it accepted before and **converts it into a number — a 13**. (An **"A"** would have become a **zero**, a **"B"** would have become a **one**, and so on.)

This number is doubled (with an **ASLA** instruction) to a **26** and **used as an index (X-reg) to fetch the third address from the table** (at **$84B. 84C**) to the JMP instruction. **When the JMP instruction is reached, it has the address of the tone routine — $972 — to jump to**. The TONE routine is just where we wanted to direct the program.

The TONE routine picks up its parameters (more about that below) and makes the sound you wanted. When finished, TONE jumps to an Applesoft routine called **DATA**. **DATA** makes sure the current statement is finished before returning to Applesoft's interpreter to await your next instruction.

continued on next page

Amp-L-Soft (Cont.)

So, JUMP receives control from the **& Jump** (at **$3F5**) in Page Three; figures out which routine you want according to the letter code; and then jumps to your chosen routine. **It expands one ampersand instruction into 26 possible commands**. Any commands that we don't use, like the **D** or **E**, have Applesoft's **?SYNTAX ERROR** message routine selected; only the routines we actually have loaded can be selected by the letter code.

LOADING YOUR OWN ROUTINES

If you want to use some other ampersand routine at the same time you are using Amp-L-Soft, you can do so. Just choose one of the **unused letters**, **Z**, for example, and **POKE** the address of your routine into the **Jump Table** in JUMP. You can find the POKE addresses to use in the program listing. You then call the routine by:

&Z(any parameters)

assuming you chose **"Z"** as its letter code. **The opening bracket is a must.** Follow the bracket with any symbols and parameters required by the routine, (**except for the ampersand itself**). Don't repeat **"&"**, since you only need one **&** symbol to activate a routine.

WHY USE THE "&"?

You may wonder why the ampersand feature is used at all, or why we would go to the trouble of extending it with a table. After all, you could call the TONE routine directly with:

CALL 2418, P, D

if TONE had a **JSR CHKCOM** statement at the beginning to gobble the first comma. The ampersand method of calling machine language subroutines appears more complicated (something to avoid!) at first.

But, you can use ampersand calls a lot easier than calling them through Applesoft. All you need is **a single letter** for each routine — a letter that's easier to remember than a memory location number when you're programming.

And don't forget, you would probably have to convert the memory location number from hex to a decimal number in order to CALL it. Then you'd have a problem if you changed or relocated anything. You'd have to search through all your programs and change one address for another at each CALL affected. It's much better to be able to make all the changes in the Amp-L-Soft files only, and leave all the programs alone. Then, just load the Amp-L-Soft program on each disk, without worrying about what the programs are doing. For these reasons, you will find Amp-L-Soft easy to use, expand and maintain.

APPLESOFT ROUTINES — HOW IT WORKS

Remember the three kinds of parameters we looked at (Values, Variables, and Array Names) way back at the beginning? If you want to know how the routines access them, then this section's for you. Its not too difficult to follow if you have been doing any machine language programming. You can even customize your Amp-L-Soft package to include your own routines.

Here's how to use Applesoft in accessing parameters.

If you do a disassembly list starting at **$00B1** in Page zero, you will find a short routine that **fetches a byte** from somewhere, using the address at **$00B8. 00B9**, to the accumulator. You can see that it advances the pointer at **$00B8. 00B9** first. Then it gets the first printable character (byte), and finally converts it if it is numeric. The routine **($00B1)** is called **CHRGET**, and the pointer it uses (**$00B8. 00B9**) is called **TXTPTR**.

Now, if you are using Applesoft in its command mode (from the keyboard) TXTPTR puts data into Page Two (where it is found when you list CHRGET). Whenever you are executing a **program** however, TXTPTR is used by Applesoft to point into your program while Applesoft reads the program text and interprets what it finds.

When a **machine language routine** is called (in an Applesoft statement), TXTPTR points to the next character in your program that follows the CALL address. If that call is an ampersand, then **TXTPTR contains the address of the first character following "&" in your program**. The character itself is in the **A-register**. The trick to handling parameters in an Applesoft program is to know where TXTPTR is at all times.

We can use **existing** Applesoft routines to edit the bytes we pick up at TXTPTR. We can exit through a routine called **SNERR** if we don't like what we get. **SNERR** prints the dreaded **"?SYNTAX ERROR"** message and goes to Applesoft's command mode, halting the program.

You can see the **JUMP** routine do this. The first thing JUMP does when executed is to save the **A-register** and then perform a **JSR ISLETC**. This routine checks that the A-register has a **letter** — **"A" to "Z"** — in it. If not, the carry is cleared and we know to exit through the SNERR routine. If the routine being called is valid, we use CHRGET to get the next character. Whenever CHRGET returns to us, it has the next character in the A-register. Now JUMP does the same thing again, but it uses **CHKOPN** to check that the current character is an open bracket. This time, **CHKOPN** will exit through **SNERR** or **GETCHR** depending on what it finds.

Now let's see what **JUMP** does when it is ready to jump to your chosen routine. It executes a **JSR CHRGOT** immediately before the **JMP**. CHRGOT is a secondary entry point to CHRGET. CHRGOT does not advance TXTPTR, so it gets the **same** character that the previous CHRGET fetched. Then the jump is made to your chosen routine with the A-register containing the current character — the one immediately following "(" in your program — and TXTPTR points to it as well.

Any ampersand routine, whether it is reached via JUMP or directly from $3F5, has TXTPTR pointing to the first character in the parameter list, and that character — edited by CHRGET — is in the A-register. JUMP is transparent to any ampersand routine.

You pick up a parameter by executing a **JSR** to an Applesoft routine that has its own **JSR CHRGET** and puts some value or pointer in a convenient location for you to use. Most of these routines require that **TXTPTR** be set to the first character of the parameter, and then they will exit through **CHRGET** to leave **TXTPTR** set to the delimiter (like a comma) which follows. This makes things easy for us.

We have already used one of these routines, **CHKOPN**. It would have exited to SNERR if it didn't accept the parameters it was given. It left TXTPTR pointing to the first byte following the "(". Between the parameters we used a similar one — **JSR CHKCOM**. If this routine is called with TXTPTR on a **comma**, it returns via **GETCHR**, ready for the next parameter, but it will go to SNERR if a comma isn't present. So, you can use **CHKCOM between parameters** to get from the end of one parameter to the beginning of another.

THE SYSCALL EXAMPLE

Look at the **SYSCALL** listing; it has a few **JSR CHKCOM**'s in it.

Okay, let's get some parameters.

GETBYT picks up an expression. When you want a **value between zero and 255**, **GETBYT** will get it from the expression and deliver it in the **X-register**. SYSCALL uses three of them to pick up the register values. **GETBYT** is at **$E6F8**.

FRMNUM also picks up an expression but it delivers the expression to the **floating-point accumulator — FAC**. So, you can get a value of any size, not just a single byte value. If you immediately follow **JSR FRMNUM** by **JSR GETADR**, then your value in **FAC** is converted to an address in **LINNUM ($50. 51)** in **LO. HI format**. This is how **SYSCALL** picks up the call address as its **fourth** parameter. **FRMNUM** is at **$DD67**; **GETADR** is at **$E752**.

PTRGET is used to access strings and parameters. It will pick up any variable and put its address in **VARPNT ($83. 84)**. At that address you will find the **floating point number**, **integer**, or **string descriptor** of the variable named at **TXTPTR**. In SYSCALL for example, PTRGET is used to get the address in which to put the value of the carry flag. It assumes an integer variable, so it puts a zero in the first location (integer high byte) and then a zero or one in the next location (integer low byte). **PTRGET** is at **$DFE3**.

Look at some examples of using **PTRGET** to read and write to strings. **See SUBSTRING for examples of reading strings. See the INPUT routine as an example of writing a string by first creating space for it.** You use **PTRGET** to find the address of the string's descriptor: length, address-low, address-high. Pick up the descriptor using **VARPNT** and then move it to page zero. Then you can use the string address to access the characters in the string.

WORKING WITH ARRAYS

You can also work with **entire arrays** after you have accessed single variables. The key routine is **GETARYPT** at **$F7D9**. Call it as you would call **PTRGET**, but it won't give you a variable. It gives **the location of the array's name**. The address of the name is in **LOWTR**, at **$9B. 9C**. The **TAGSORT** routine uses **GETARYPT** twice: once for the name of the **string array**, and once for the address of the **tag array**. It assumes their type and order, so it calculates the offset to the first entry with a simple formula. To do the same thing yourself, work out the distance, in bytes, using the information on page 137 of your Applesoft manual (for the array you want to access).

When writing an ampersand routine with any **numeric** parameters that you don't have to save, pick them up as **values**, **not as variables**. Use **GETBYT** for any **single** byte values and **FRMNUM** for any **larger** values. Follow **FRMNUM** with **GETADR** if it's an address.

You will need a **variable** for a string or a numeric parameter that must be returned; **PTRGET** will find it for you. And good old **CHKCOM** between the parameters "gobbles" commas for you.

EXIT AMPERSAND

It's easy to exit from an ampersand routine; just **JMP DATA**. The routine at **$D995** in Applesoft makes sure that **TXTPTR** is at the end of the statement. So, Applesoft will be at the end of a line or at a colon when DATA returns.

LOADING YOUR OWN ROUTINE

If your routine is small enough to fit into the space at **$D38. DFF**, then assemble it there. BLOAD AMP-L-SOFT and **move the new routine up** to **$4D38. 4DFF**. Use the JUMP listing to find the addresses for the letter code you have chosen. **Set the table in page $48 rather than in page 8.** (Remember that Amp-L-Soft first loads beginning at **$4750**, then relocates its routines downstairs to **$80C** for use.) For example, the code for **"Z"** is used by entering the routine's address in as

***4879: 38 0D**

After these two changes, just

BSAVE AMPERSANDS, A$4750, L$,6FE

and you have a custom version of Amp-L-Soft containing your own routine.

Amp-L-Soft LOADER

For most applications, Amp-L-Soft loads and relocates itself for you without any trouble. However, should you have a large program that clobbers **LOADER** while relocating, or you want to use some package that also uses the low memory area, then you may consider modifying LOADER. You can fix the first problem — big programs — easier than the second one.

If you find programs **overwriting** LOADER during relocation, then re-assemble LOADER at a higher address. **The present address is only needed if you have a 32K system.** If yours is a 48K system then move it higher in memory. Leave a little headroom, though, because some programs may re-assign a string or two before loading Amp-L-Soft. All of Amp-L-Soft except LOADER has been assembled to execute at its relocated position in low memory. So, only LOADER needs to be re-assembled. Just change the **ORG**, assemble, and copy it in over the top of the old LOADER at **$4750. 47FB**. Then BSAVE the newly entered LOADER.

If you have the second type of problem — conflicting packages — then you're on your own. You could re-assemble all of the Amp-L-Soft routines to run elsewhere, and then re-write AMPERLOAD. Depending on where you decide to load the programs, this could be easy or difficult. Sticking everything just below the DOS buffers and then resetting **HIMEM:** to protect the programs is perhaps the easiest. But be careful not to use **MAXFILES**. And remember, new RUN commands clear memory, so the **Load** statements must be in each program, not just the HELLO program. See the BOOTER listing and the figures for the details.

If you do make any changes that you feel may be of use to others, please write and share them. And let us know where you are using Amp-L-Soft. It would be great to see some neat new program that exploits its features.

continued on next page

Table 2
REFERENCE SUMMARY

Uses functions:
DEF FN AD(X) = PEEK(X) + 256*PEEK(X+1)
DEF FN LO(X) = INT(X/256)
DEF FN HI(X) = X - 256*INT(X/256)

To install: BLOAD AMP-L-SOFT
CALL FN AD(FN AD(999)-79)

To remove: FP

TAGSORT &A(s, t, f, l)
- sort string array name
- tag integer array name
- value of first element
- value of last element

INPUT &I (s)
- input string variable

SUBSTRING &B(o, t, p)
- object string variable
- target string variable
- pointer integer variable

TONE &N(p, d)
- period value
- duration value

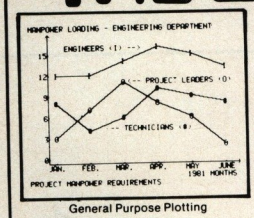
SYSCALL &C(a, x, y, r, c)
- A-reg set value
- X-reg set value
- Y-reg set value
- routine address value
- carry flag integer variable

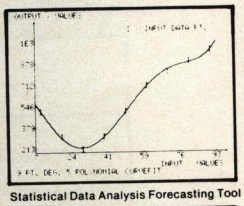
The parameters are passed in the directions shown.

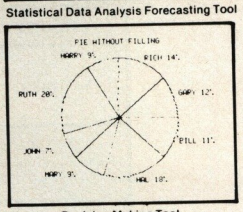
THE SUPERPLOTTER©

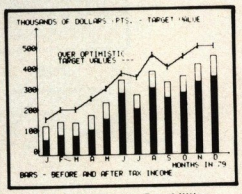
version 2.2 TM

For use with Apple Computer Systems


General Purpose Plotting


Statistical Data Analysis Forecasting Tool


Decision Making Tool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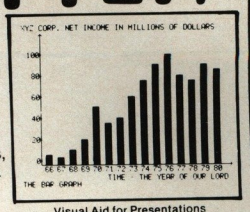
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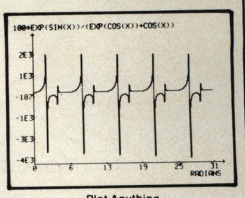
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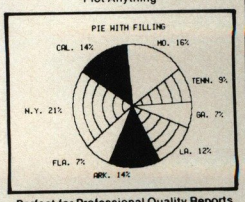
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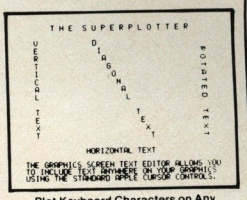
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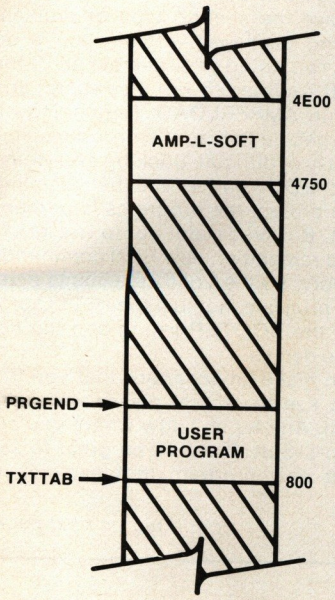


Figure 1(a). AMPL-L-SOFT loads from disk to memory below the DOS of a 32K system. From there, it must be called at $4750.

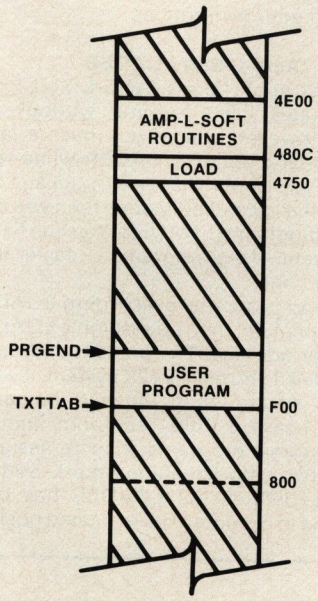


Figure 1(b). The first part called LOAD executes when run. It relocates the user program upward in memory to make room for AMP-L-SOFT ROUTINES.

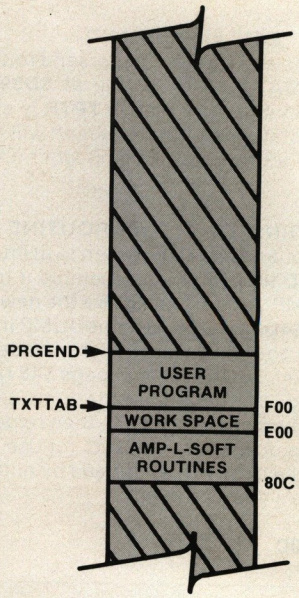


Figure 1(c). Finally, LOAD moves AMP-L-SOFT ROUTINES into low memory where it is safe from MAXFILES, NEW, or RUN commands. Only an FP command can clobber it now. LOAD calls it to set its "&" hook in Page Three, completing the load.

Figure 2. The Memory Map of AMP-L-SOFT. After being moved to low memory, JUMP and the five routines are ready for use with the "&" hook set. The one Page work space is used by TAGSORT, but can also be used as a temporary buffer.

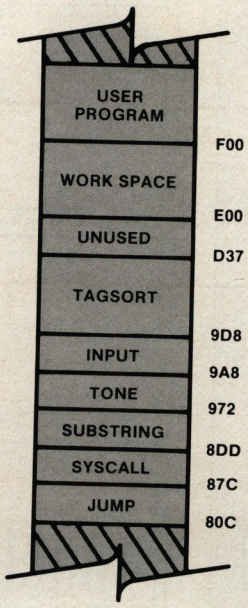
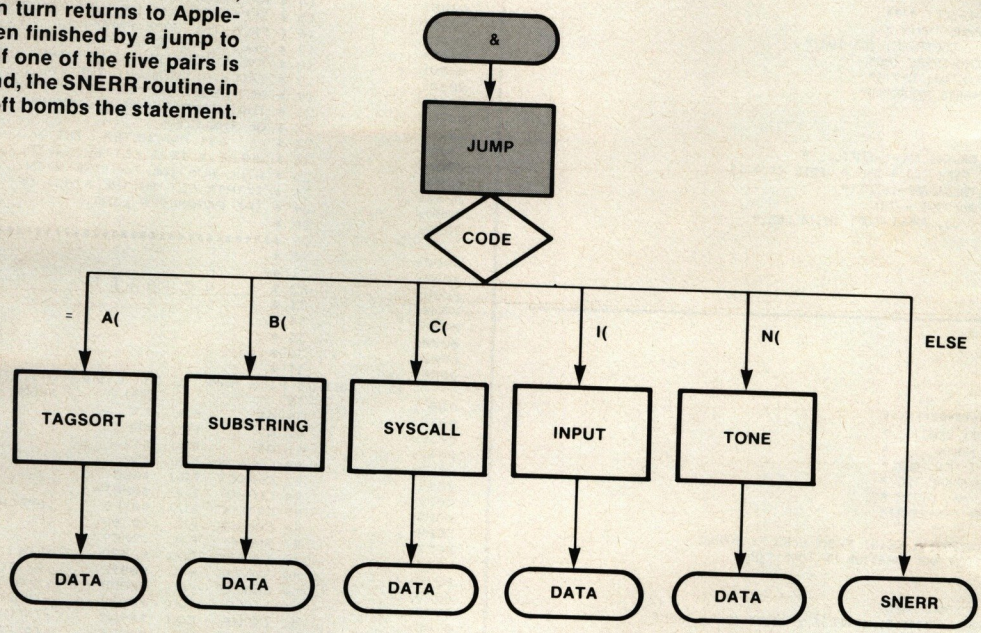


Figure 3. Any of the five routines are called using the "&" hook in Page Three. JUMP gains control and looks at the two characters following the "&". It expects a letter followed by an open bracket — "(". If one of the five codes is found, it jumps to the chosen routine, which in turn returns to Applesoft when finished by a jump to DATA. If one of the five pairs is not found, the SNERR routine in Applesoft bombs the statement.



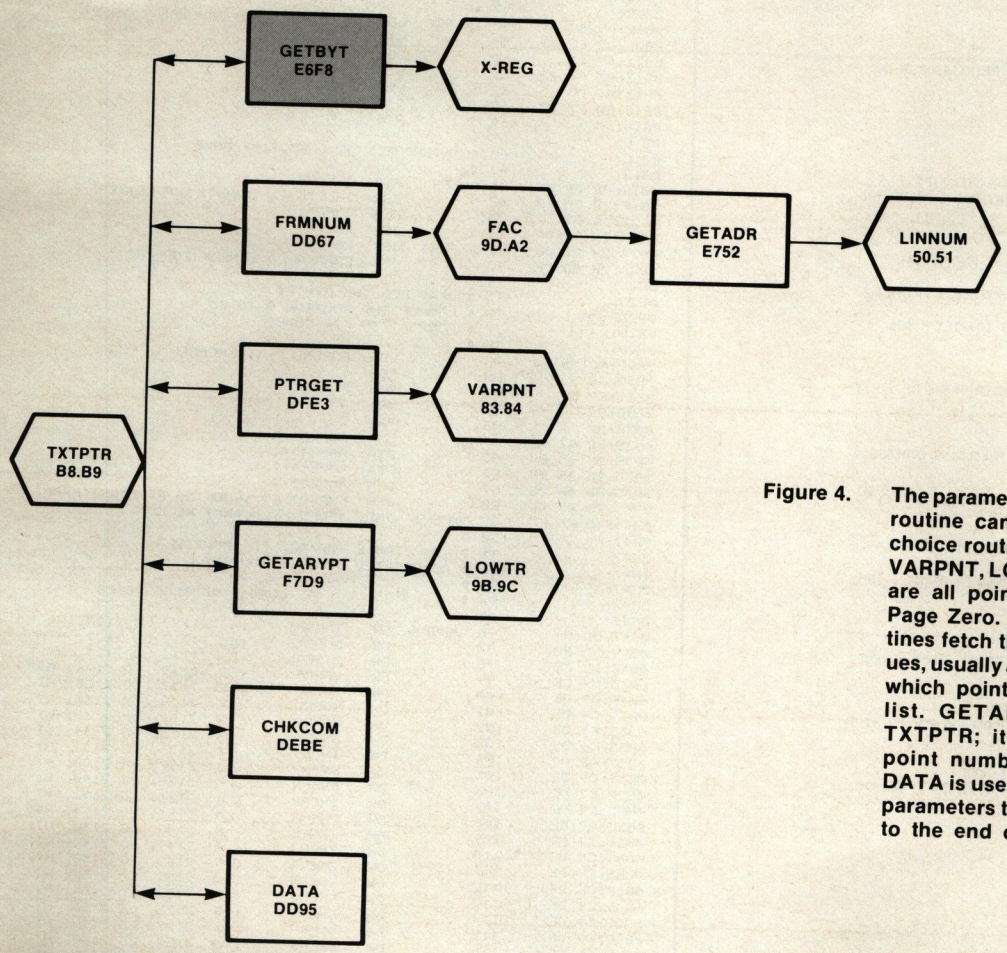


Figure 4. The parameters in an ampersand routine can be read by a few choice routines. TXTPTR, FAC, VARPNT, LOWTR, and LINNUM are all pointers and values of Page Zero. The Applesoft routines fetch the pointers and values, usually advancing TXTPTR, which points at the parameter list. GETADR does not use TXTPTR; it converts floating point numbers to addresses. DATA is used when finished the parameters to advance TXTPTR to the end of the statement.

continued on next page

Amp-L-Soft (Cont.)

Amp-L-Soft, Electronic Message Center, and Apple Bowl Football are available on diskette for an introductory price of $19.95 plus $1.50 shipping/handling ($2.50 outside the U.S.) from NIBBLE, P.O. Box 325, Lincoln, MA 01773. Offer expires Jan. 31, 1983.

```
10  REM   ********************
20  REM   * BOOTER            *
30  REM   * BY PAUL IRWIN     *
40  REM   * COPYRIGHT (C) 1982 *
50  REM   * BY MICRO-SPARC INC *
60  REM   * LINCOLN, MA. 01773 *
70  REM   ********************
80  TEXT : HOME
90  PRINT "   *** AMP-L-SOFT ***"
100  PRINT "      BY PAUL IRWIN "
110  PRINT : PRINT "    COPYRIGHT (C) 1982"
120  PRINT "     BY MICRO-SPARC INC"
130  PRINT "     LINCOLN, MA. 01773"
140  PRINT "   ALL  RIGHTS RESERVED"
150  PRINT
160  PRINT
170  PRINT : PRINT
180 : PRINT "       LOADING AMP-L-SOFT...."
190  DEF  FN AD(X) =  PEEK (X) + 256 *  PEEK (X + 1)
200  PRINT  CHR$ (4);"BLOADAMP-L-SOFT"
210  CALL  FN AD( FN AD(999) - 79)
220  PRINT "            ... AMP-L-SOFT INSTALLED."
230  PRINT : PRINT
```

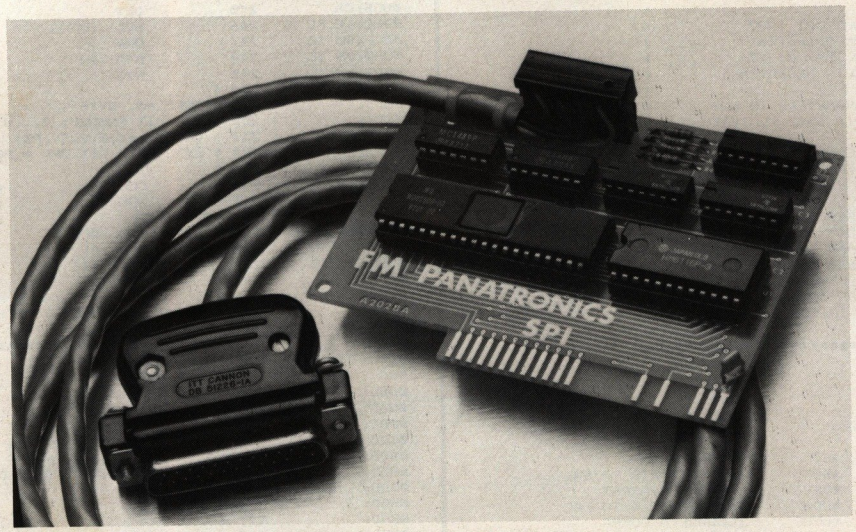
```
10  REM   ********************
20  REM   * AMP-L-SOFT DEMO    *
30  REM   * BY PAUL IRWIN      *
40  REM   * COPYRIGHT (C) 1982 *
50  REM   * BY MICRO-SPARC INC *
60  REM   * LINCOLN, MA. 01773 *
70  REM   ********************
80  REM  DEMO TONE
90  HOME : VTAB 5: INVERSE : PRINT "TONE DEMO ": NORMAL
100  INPUT "ENTER PITCH AND DURATION OF TONE ";P,D
110  & N(P,D)
120  PRINT
130  REM  DEMO FREE FORMAT INPUT
140  GOSUB 10000: HOME : VTAB 5: INVERSE : PRINT "DATA INPUT
     DEMO": NORMAL
150  PRINT : PRINT "ENTER A STRING WITH ANY CHARACTERS": PRI
     NT
160  & I(IN$)
170 A$(1) = IN$
180  PRINT A$(1)
190  REM  DEMO SUBSTRING SEARCH
200  PRINT
210  GOSUB 10000: HOME : VTAB 5: INVERSE : PRINT "SUBSTRING
     SEARCH DEMO ": NORMAL
220  INPUT "ENTER SUBSTRING TO SEARCH ";A$
230 P$ = 1
240 B$ = A$(1)
250  & B(B$,A$,P$)
260  PRINT
270  PRINT "THE SUBSTRING '";A$;"' BEGINS IN LOC ";P$
280  GOSUB 10000: HOME : VTAB 5: PRINT : INVERSE : PRINT "HE
     X CONVERSION DEMO": NORMAL
290  REM  DEMO HEX CONVERSION W/AMP SUBSTRING
300  INPUT "ENTER NUMBER 1-255 ";N
310  PRINT : PRINT "THE HEX EQUIVALENT IS:": PRINT "$";
320  & C(N,0,0,64986,C$)
330  GOSUB 10000: HOME : VTAB 5: PRINT : INVERSE : PRINT "NU
     MBER OF SPACES DEMO": NORMAL
340  PRINT : INPUT "ENTER NUMBER OF SPACES (0-230) ";SP$
345  PRINT  CHR$ (219);
350  & C(0,SP$,0,63818,C$)
351  PRINT  CHR$ (221)
360  GOSUB 10000: HOME : VTAB 5: INPUT "ENTER THE # OF STRIN
     GS TO SORT ";N
370  DIM R$(N + 1),T$(N + 1)
380 B$ = "ABCDEFGHIJKLMNOPQRSTUVWXYZ"
390  TEXT : HOME : VTAB 5: FLASH : PRINT "BUILDING STRINGS "
     : NORMAL
400  FOR F = 1 TO N: FOR G = 1 TO 5
410 R$(F) = R$(F) +  MID$ (B$, INT ( RND (1) * 24) + 1,1)
420 T$(F) = F
430  NEXT G,F
440  HOME : VTAB 5: PRINT "PRESS RETURN TO LIST RAW DATA": I
     NPUT "PRESS CTRL S TO PAUSE/RESUME ";XX$
450  FOR F = 1 TO N: PRINT R$(F),T$(F): NEXT F: PRINT : INPU
     T "PRESS RETURN FOR SORT ";XX$
460  PRINT "SORT BEGUN"
470  & A(R$,T$,1,N)
480  PRINT "SORT ENDED"
490  PRINT "PRESS RETURN TO LIST SORTED DATA": INPUT "PRESS
     CTRL S TO PAUSE/RESUME ";XX$
500  HOME : VTAB 5: FOR F = 1 TO N
510  IF R$(F) > R$(F + 1) THEN  INVERSE
520  PRINT F;: POKE 36,10: PRINT R$(F);: POKE 36,20: PRINT T
     $(F): NEXT F
530  NORMAL : GOSUB 10000
540  HOME : VTAB 12: PRINT "END OF DEMO": END
10000  PRINT : PRINT : PRINT "PRESS ANY KEY TO CONTINUE =>";
     : GET A$: PRINT : RETURN
```

```
SOURCE FILE: AMP-L-SOFT UTILITIES
0000:                 1 ********************************
0000:                 2 *                              *
0000:                 3 *    AMP-L-SOFT UTILITIES      *
0000:                 4 *                              *
0000:                 5 ********************************
0000:                 6 *                              *
0000:                 7 *          J U M P             *
0000:                 8 *                              *
0000:                 9 *   ASSEMBLER: APPLE II V 1.0  *
0000:                10 *      AUTHOR: PAUL IRWIN      *
0000:                11 *     WRITTEN: MAR, 1981       *
0000:                12 *                              *
0000:                13 * INTERPETS THE & COMMAND FROM *
0000:                14 * APPLESOFT.  ALLOWS UP TO 26  *
0000:                15 * SEPERATE ROUTINES TO BE USED *
0000:                16 * FROM THE SAME PROGRAM.  TO   *
0000:                17 * USE, FIRST CALL 768 TO SETUP *
0000:                18 * THE & HOOK AND CLEAR THE     *
0000:                19 * TABLE.  THEN SET THE TABLE   *
0000:                20 * ADDRESSES AS NEEDED.  AFTER  *
0000:                21 * THAT, AMPERSAND STATEMENTS   *
0000:                22 * OF THE FORM                  *
0000:                23 *     &X( PARAMETER LIST )     *
0000:                24 * WHERE X IS A LETTER, A TO Z, *
0000:                25 * WILL RUN THE ROUTINE WITH    *
0000:                26 * TXTPTR SET TO THE FIRST OF   *
0000:                27 * THE PARAMETER LIST.          *
0000:                28 *                              *
0000:                29 ********************************
0000:                30 *
0000:                31 *
0000:                32 *        E Q U A T E S
0000:                33 *
0000:                34 *
0000:                35 *
0000:                36 *
0000:                37 *
----- NEXT OBJECT FILE NAME IS AMP-L-SOFT UTILITIES.OBJ0
080C:                38          ORG     $080C
003C:                39 A1       EQU     $3C
003E:                40 A2       EQU     $3E
0042:                41 A4       EQU     $42
0050:                42 LINNUM   EQU     $50
00B1:                43 CHRGET   EQU     $00B1
00B7:                44 CHRGOT   EQU     $00B7
03F5:                45 EXTLOC   EQU     $03F5     ;AMPERSAND VECTOR
DEBB:                46 CHKOPN   EQU     $DEBB     ;EDIT '('
DEC9:                47 SNERR    EQU     $DEC9
E07D:                48 ISLETC   EQU     $E07D     ;EDIT 'A' TO 'Z'
087C:                49 SYSCAL   EQU     $087C     ;SYSTCALL ROUTINE
08DD:                50 SUBSTR   EQU     $08DD     ;SUBSTRING SEARCH
0972:                51 TONES    EQU     $0972     ;TONES ROUTINE
09A8:                52 INPUT    EQU     $09A8     ;INPUT ANYTHING
09DB:                53 TAGSRT   EQU     $09DB     ;TAGSORT RTNE
080C:                54 *
080C:                55 *
080C:                56 * INITIALIZE THE INTERPETER
080C:                57 *
080C:A9 4C           58 INITAL   LDA     #$4C      ;JMP OPCODE
080E:8D F5 03        59          STA     EXTLOC
0811:A9 1C           60          LDA     #>AMPER
0813:8D F6 03        61          STA     EXTLOC+1
0816:A9 08           62          LDA     #<AMPER
0818:8D F7 03        63          STA     EXTLOC+2
081B:60              64          RTS
081C:                65 *
081C:                66 * INTERPRET THE & ROUTINE NAME
081C:                67 *
081C:8D 7B 08        68 AMPER    STA     AMPERB    ;TEMPORARILY
081F:20 7D E0        69          JSR     ISLETC    ;CHECK FOR LETTER
0822:B0 03           70          BCS     AMPER1
0824:20 C9 DE        71          JSR     SNERR
0827:20 B1 00        72 AMPER1   JSR     CHRGET
082A:20 BB DE        73          JSR     CHKOPN    ;CHECK FOR '('
082D:                74 *
082D:                75 * OKAY FOR THE SYNTAX.
082D:                76 * LOOKUP THE ROUTINE 0 TO 25
082D:                77 * FOR 'A' TO 'Z' CODE
082D:                78 *
082D:AD 7B 08        79          LDA     AMPERB    ;REMEMBER LETTER
0830:38              80          SEC
0831:E9 C1           81          SBC     #'A'
0833:0A              82          ASL     A
0834:AA              83          TAX
0835:BD 47 08        84          LDA     AMPERA,X
0838:8D 45 08        85          STA     AMPER3+1
083B:BD 48 08        86          LDA     AMPERA+1,X
083E:8D 46 08        87          STA     AMPER3+2
0841:20 B7 00        88          JSR     CHRGOT    ;LOOKING AT FIRST PARM
0844:4C FF FF        89 AMPER3   JMP     $FFFF     ;AWAY WE GO!
0847:                90 *
0847:                91 * JUMP TABLE FOR ALL '&' ROUTINES
0847:                92 * AS CREATED BY INIT ROUTINE
0847:                93 *                          CODE    ADDRESS POKES
0847:                94 *                          ----    -------------
0847:                95 *
0847:D8 09           96 AMPERA   DW      TAGSRT    ;A  2119, LO 2120, HI
0849:DD 08           97          DW      SUBSTR    ;B  2121, LO 2122, HI
084B:7C 08           98          DW      SYSCAL    ;C  2123, LO 2124, HI
084D:C9 DE           99          DW      SNERR     ; D 2125, LO 2126, HI
084F:C9 DE          100          DW      SNERR     ; E 2127, LO 2128, HI
0851:C9 DE          101          DW      SNERR     ; F 2129, LO 2130, HI
0853:C9 DE          102          DW      SNERR     ; G 2131, LO 2132, HI
0855:C9 DE          103          DW      SNERR     ; H 2133, LO 2134, HI
0857:A8 09          104          DW      INPUT     ; I 2135, LO 2136, HI
0859:C9 DE          105          DW      SNERR     ; J 2137, LO 2138, HI
085B:C9 DE          106          DW      SNERR     ; K 2139, LO 2140, HI
085D:C9 DE          107          DW      SNERR     ; L 2141, LO 2142, HI
085F:C9 DE          108          DW      SNERR     ; M 2143, LO 2144, HI
0861:72 09          109          DW      TONES     ; N 2145, LO 2146, HI
0863:C9 DE          110          DW      SNERR     ; O 2147, LO 2148, HI
0865:C9 DE          111          DW      SNERR     ; P 2149, LO 2150, HI
0867:C9 DE          112          DW      SNERR     ; Q 2151, LO 2152, HI
0869:C9 DE          113          DW      SNERR     ; R 2153, LO 2154, HI
086B:C9 DE          114          DW      SNERR     ; S 2155, LO 2156, HI
086D:C9 DE          115          DW      SNERR     ; T 2157, LO 2158, HI
086F:C9 DE          116          DW      SNERR     ; U 2159, LO 2160, HI
0871:C9 DE          117          DW      SNERR     ; V 2161, LO 2162, HI
```

```
0873:C9 DE      118          DW   SNERR      ; W  2163, LO 2164, HI
0875:C9 DE      119          DW   SNERR      ; X  2165, LO 2166, HI
0877:C9 DE      120          DW   SNERR      ; Y  2167, LO 2168, HI
0879:C9 DE      121          DW   SNERR      ; Z  2169, LO 2170, HI
087B:00         122 AMPERB   BRK
087C:           123 ********************************
087C:           124 *                              *
087C:           125 *     SYSCALL &                *
087C:           126 *   BY PAUL IRWIN              *
087C:           127 *                              *
087C:           128 *   COPYRIGHT (C) 1982         *
087C:           129 *   BY MICRO-SPARC INC         *
087C:           130 *   LINCOLN, MA. 01773         *
087C:           131 *  ALL  RIGHTS RESERVED        *
087C:           132 *                              *
087C:           133 * PASSES PARAMETERS TO ANY     *
087C:           134 * ROUTINE VIA 6502 REGISTER    *
087C:           135 *                              *
087C:           136 * CALL SEQUENCE:               *
087C:           137 *    &C(AR,XR,YR,R,C%)         *
087C:           138 *                              *
087C:           139 * WHERE                        *
087C:           140 *   &C (PARSED BY AMPERJUMP    *
087C:           141 *   AR = PARAM IN 6502 A-REG   *
087C:           142 *   XR = PARAM IN 6502 X-REG   *
087C:           143 *   YR = PARAM IN 6502 Y-REG   *
087C:           144 *    R = ADDRESS OF ROUTINE    *
087C:           145 *   C% = CARRY FLAG RETURNED   *
087C:           146 *        IN INTEGER VARIABLE.  *
087C:           147 *                              *
087C:           148 ********************************
087C:           149 *
087C:           150 *
087C:           151 *
087C:           152 *
087C:           153 *       EQUATES
087C:           154 *
0083:           155 VARPNT  EQU  $83        ;ADDR OF VAR
D995:           156 DATA    EQU  $D995      ;MOVE TXTPTR TO END
DFE3:           157 PTRGET  EQU  $DFE3      ;ADDR TO VARPNT
DD67:           158 FRMNUM  EQU  $DD67      ;NUM FORMULA TO FAC
DEBE:           159 CHKCOM  EQU  $DEBE      ;GOBBLE A COMMA
E6F8:           160 GETBYT  EQU  $E6F8      ;GET INTGR TO X-REG
E752:           161 GETADR  EQU  $E752      ;FAC TO LINNUM
087C:           162 *
087C:           163 *
087C:           164 *
087C:           165 *
087C:           166 *   ROUTINES
087C:           167 *
087C:           168 *
087C:           169 * GET THE CALLING PARAMS
087C:           170 *
087C:20 F8 E6   171          JSR  GETBYT    ;GET A-REG
087F:8A         172          TXA
0880:48         173          PHA
0881:20 BE DE   174          JSR  CHKCOM
0884:20 F8 E6   175          JSR  GETBYT    ;GET X-REG
0887:8A         176          TXA
0888:48         177          PHA
0889:20 BE DE   178          JSR  CHKCOM
088C:20 F8 E6   179          JSR  GETBYT    ;GET Y-REG
088F:8A         180          TXA
0890:48         181          PHA
0891:20 BE DE   182          JSR  CHKCOM
0894:20 67 DD   183          JSR  FRMNUM    ;GET RTNE ADDR.
0897:20 52 E7   184          JSR  GETADR    ;...INTO LINNUM
089A:           185 *
089A:           186 * SET CELL ADDRESS
089A:           187 *
089A:A5 50      188          LDA  LINNUM
089C:8D AA 08   189          STA  CALL+1
089F:A5 51      190          LDA  LINNUM+1
08A1:8D AB 08   191          STA  CALL+2
08A4:           192 *
08A4:           193 * SETUP REGISTERS FOR CALL
08A4:           194 *
08A4:68         195          PLA
08A5:A8         196          TAY
08A6:68         197          PLA
08A7:AA         198          TAX
08A8:68         199          PLA
08A9:20 FF FF   200 CALL     JSR  $FFFF     ;CALL THE ROUTINE
08AC:           201 *
08AC:           202 * RETURN CARRY FLAG TO CALLER
08AC:           203 *
08AC:08         204          PHP
08AD:20 BE DE   205          JSR  CHKCOM    ;GRAB THE P-REG
08B0:20 E3 DF   206          JSR  PTRGET    ;FIND RETURN PARAM
08B3:A0 00      207          LDY  #0
08B5:A9 00      208          LDA  #0
08B7:91 83      209          STA  (VARPNT),Y ;INTEGER HI=0
08B9:C8         210          INY
08BA:28         211          PLP
08BB:90 02      212          BCC  *+4
08BD:A9 01      213          LDA  #1        ; IF CARRY IS ON
08BF:91 83      214          STA  (VARPNT),Y ;INTEGER LO=C
08C1:4C 95 D9   215          JMP  DATA      ;END THE STMNT
08C4:           216 *
08C4:           217 *
08C4:           218 ******************************
08C4:           219 *                            *
08C4:           220 *   LITTLE BIT PICKERS       *
08C4:           221 *                            *
08C4:           222 * THREE SYSCALL& ROUTINES TO *
08C4:           223 * READ AND WRITE TO THE BITS *
08C4:           224 * OF A GIVEN BYTE.           *
08C4:           225 *                            *
08C4:           226 ******************************
08C4:           227 *
08C4:           228 * A% = BYTE TO READ
08C4:           229 * X% = BIT NUMBER: 7...0
08C4:           230 * &C(A%,X%,0,2244,P%)
08C4:           231 * VALUE OF BIT = P%
08C4:           232 *
08C4:4A         233 READ     LSR  A         ;READS VALUE OF
08C5:CA         234          DEX            ;A BIT WITHIN A BYTE
08C6:10 FC      235          BPL  READ      ; AS A 0 IF BIT=OFF
08C8:60         236          RTS            ;OR A 1 IF BIT=ON.
08C9:           237 *
08C9:           238 * POKE 60, BYTE
08C9:           239 * X%= BIT NUMBER: 7...0
08C9:           240 * &C(0,X%,0,2249,P%)
08C9:           241 * BYTE WITH BIT ON = PEEK(60)
08C9:           242 *
08C9:38         243          SEC            ;TURNS ON ONE BIT
08CA:2A         244 ONBIT    ROL  A         ;AT THE BYTE
08CB:CA         245          DEX            ;IN A1 (60, $3C)
08CC:10 FC      246          BPL  ONBIT
08CE:05 3C      247          ORA  A1
08D0:85 3C      248          STA  A1
08D2:60         249          RTS
08D3:           250 *
08D3:           251 * POKE 60, BYTE
08D3:           252 * X%= BIT NUMBER: 7...0
08D3:           253 * &C(255,X%,0,2259,P%)
08D3:           254 * BYTE WITH BIT OFF = PEEK(60)
08D3:           255 *
08D3:18         256          CLC            ;TURNS OF 1 BIT
08D4:2A         257 OFFBIT   ROL  A         ;AT THE BYTE
08D5:CA         258          DEX            ;IN A1 (60, $3C)
08D6:10 FC      259          BPL  OFFBIT
08D8:25 3C      260          AND  A1
08DA:85 3C      261          STA  A1
08DC:60         262          RTS
08DD:           263 *
08DD:           264 * SEE CALL SEQUENCE OF SYSCALL&
08DD:           265 *
08DD:           266 ********************************
08DD:           267 *                              *
08DD:           268 *       SUBSTRING&             *
08DD:           269 *     BY PAUL IRWIN            *
08DD:           270 *                              *
08DD:           271 *    COPYRIGHT (C) 1982        *
08DD:           272 *    BY MICRO-SPARC INC        *
08DD:           273 *    LINCOLN, MA. 01773        *
08DD:           274 *   ALL  RIGHTS RESERVED       *
08DD:           275 *                              *
08DD:           276 *                              *
08DD:           277 *                              *
08DD:           278 * SEARCHES AN OBJECT STRING   *
08DD:           279 * FOR A MATCH TO A TARGET     *
08DD:           280 * STRING, BEGINNING AT A GIVEN *
08DD:           281 * POSITION.                   *
08DD:           282 *                              *
08DD:           283 * CALL SEQUENCE               *
08DD:           284 *      &B (OB$,TA$,P%)         *
08DD:           285 * WHERE                       *
08DD:           286 * &B (IS PARSED BY AMPERJUMP  *
08DD:           287 * OB$ = OBJECT STRING         *
08DD:           288 * TA$ = TARGET SUBSTRING      *
08DD:           289 *  P% = INTEGER, POSITION IN  *
08DD:           290 *       OBJECT STRING          *
08DD:           291 *                              *
08DD:           292 * NORMALLY, SET P%=1. OR ELSE *
08DD:           293 * SET TO THE STARTING PLACE OF *
08DD:           294 * THE DESIRED SEARCH.         *
08DD:           295 * THE VALUE RETURNED GIVES THE *
08DD:           296 * LOCATION OF TA$ IN OB$ OR   *
08DD:           297 * ZERO IF NOT FOUND           *
08DD:           298 *                              *
08DD:           299 ********************************
08DD:           300 *
08DD:           301 *
08DD:           302 *    EQUATES
08DD:           303 *
0040:           304 A3      EQU  $40       ;ADDR TARGET STRING
FCBA:           305 NXTA1   EQU  $FCBA     ;INCR /CMP A2
08DD:           306 *
08DD:           307 *
08DD:           308 *
08DD:           309 *
08DD:           310 *    ROUTINES
08DD:           311 *
08DD:           312 *
08DD:           313 * GET ADDRESSES OF PARAMETERS
08DD:           314 *
08DD:20 E3 DF   315          JSR  PTRGET    ;ADDR. OF OBJECT
08E0:A0 00      316          LDY  #0
08E2:B1 83      317          LDA  (VARPNT),Y
08E4:8D 6F 09   318          STA  LOBJ
08E7:C8         319          INY
08E8:B1 83      320          LDA  (VARPNT),Y
08EA:85 3C      321          STA  A1
08EC:C8         322          INY
08ED:B1 83      323          LDA  (VARPNT),Y
08EF:85 3D      324          STA  A1+1
08F1:A5 3C      325          LDA  A1
08F3:18         326          CLC
08F4:6D 6F 09   327          ADC  LOBJ
08F7:85 3E      328          STA  A2
08F9:A5 3D      329          LDA  A1+1
08FB:69 00      330          ADC  #0
08FD:85 3F      331          STA  A2+1
08FF:20 BE DE   332          JSR  CHKCOM
0902:20 E3 DF   333          JSR  PTRGET    ;ADDR OF TARGET
0905:A0 00      334          LDY  #0
0907:B1 83      335          LDA  (VARPNT),Y
0909:8D 70 09   336          STA  LTAR
090C:C8         337          INY
090D:B1 83      338          LDA  (VARPNT),Y
090F:85 40      339          STA  A3
0911:C8         340          INY
0912:B1 83      341          LDA  (VARPNT),Y
0914:85 41      342          STA  A3+1
0916:A5 3E      343          LDA  A2        ;SET A2 TO THE
0918:38         344          SEC            ;LAST SUBSTRING
0919:ED 70 09   345          SBC  LTAR      ;IN OBJECT
091C:85 3E      346          STA  A2        ;TO COMPARE
091E:A5 3F      347          LDA  A2+1
0920:E9 00      348          SBC  #0
0922:85 3F      349          STA  A2+1
0924:20 BE DE   350          JSR  CHKCOM
0927:20 E3 DF   351          JSR  PTRGET    ;ADDR OF POINTER
092A:A0 01      352          LDY  #1
```

continued on page 33

CAN YOU PROGRAM YOUR SERIAL CARD? NOW YOU CAN.



The SPI card gives your APPLE II* computer a new dimension to serial I/O: firmware on RAM. This allows you to adapt the SPI to virtually any RS-232 serial device. It gives you total control.

Program it like any other region of your APPLE's memory. Examine it, change it, run it. BSAVE your SPI programs on disk. Then BLOAD the one you want directly into the SPI RAM. Anytime. Even on boot-up.

Dumb terminal, remote computer and printer applications can use the firmware provided with the SPI card. Control characters select the various features and operating modes. However, if you like to customize your firmware or have an unusual device to operate, well-documented source listings and a tips and pointers chart are included.

In the dumb terminal mode, the SPI connects your APPLE to a modem to communicate via telephone with another computer or terminal. In the remote computer mode, the SPI connects to a modem and via telephone allows another terminal to control your APPLE. The printer mode is for interfacing with a printer for hard copy or to another terminal as a remote monitor.

Now the frosting. The SPI RAM can be used to store machine language routines, utilities, or even firmware for use by other peripheral cards. No changing HIMEM or LOMEM. No worry about it being written over by another program. It's a new way to use peripheral memory.

The SPI costs only $99.50 including 5' cable and documentation. For longer cable lengths add $1.00 per foot.

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YOU HAVE TOTAL CONTROL

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- RAM can be replaced with 2716 PROM
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- Full or half duplex
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- Baud rate: 110, 300, 1200, etc.
- Word length: 5-8 bits
- Parity: odd, even, none
- Stop bits: 1-2
- Assembly language programs supplied for:
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  UART test and configuration
  Terminal mode
  Remote mode
  Printer mode
- 1 year warranty

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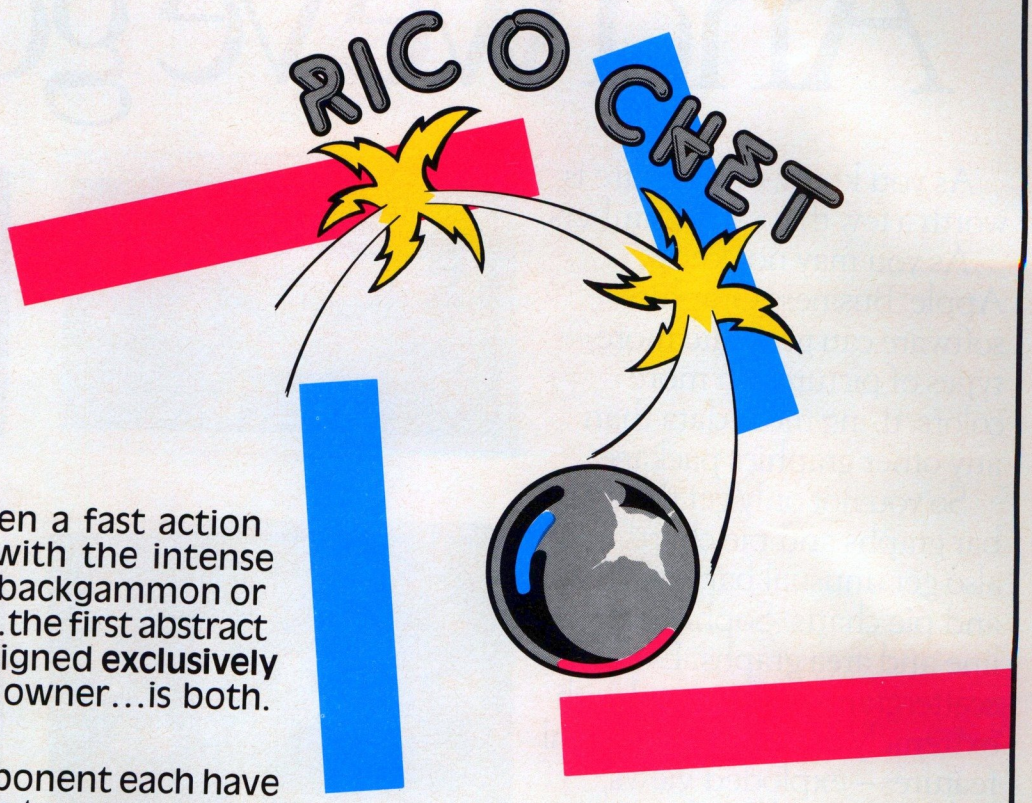

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Atari
TRS-80

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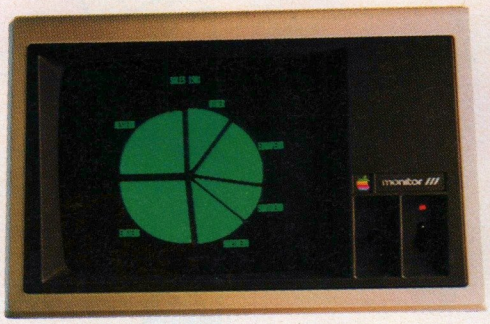

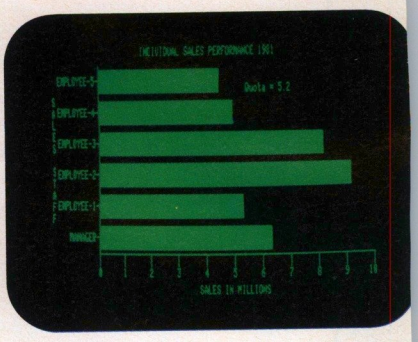

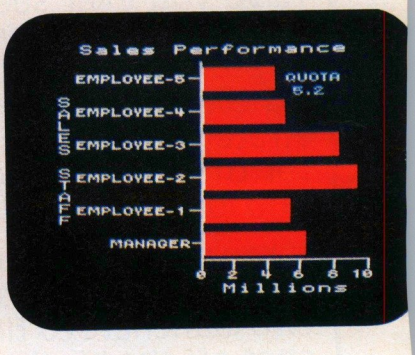

	Apple	VisiTrend/ VisiPlot	pfsGraph
Graph Types			
Line	Yes	Yes	Yes
Vertical Bar	Yes	Yes	Yes
Horizontal Bar	Yes	No	No
Side-by-side Bar	Up to 4	2	4
Pie	Yes	Yes	Yes
Partial Pie	Yes	No	No
Scattergram	Yes	Yes	No
Curve Fitting	5 Kinds	1	None
Data Points (Max.)	3500+	645	36
Plotter Compatible	Virtually Any	None	H-P7470A Only
Compatible File Types	Pascal BASIC VisiCalc	BASIC VisiCalc	pfs VisiCalc
Math Functions	Yes	Yes	No
Available Colors	6	4	4

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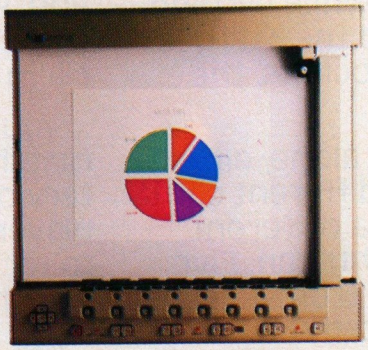

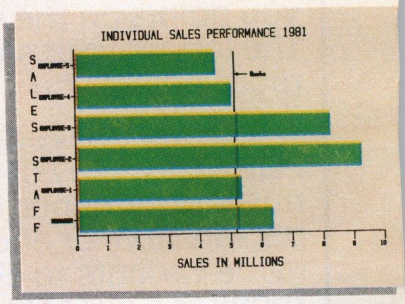

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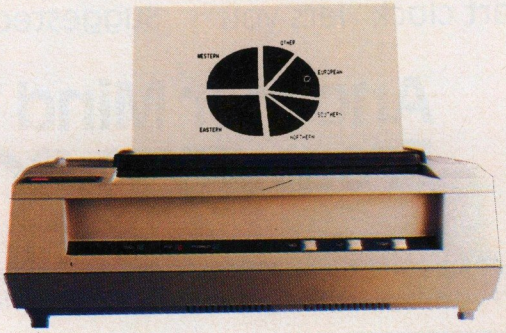

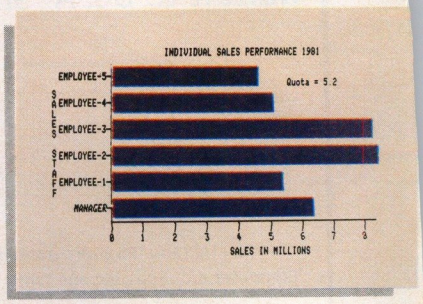

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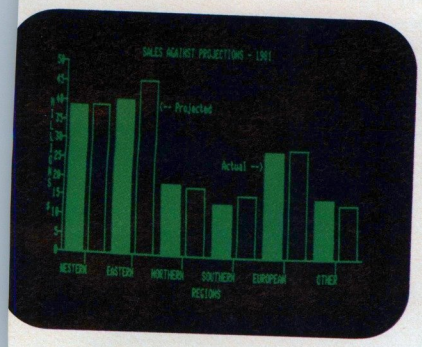

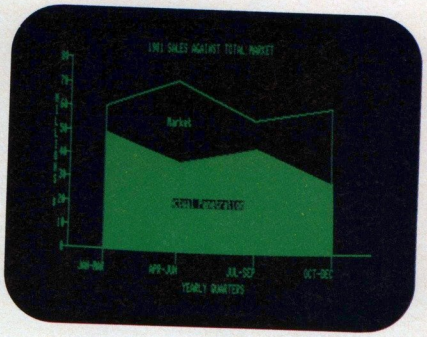

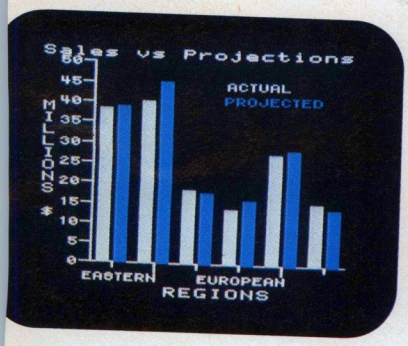

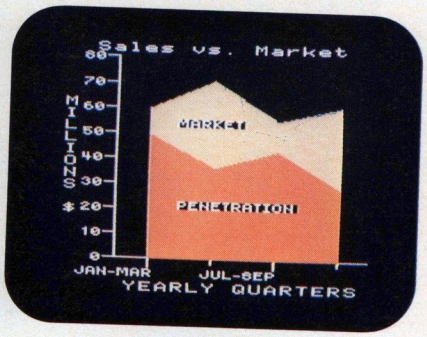

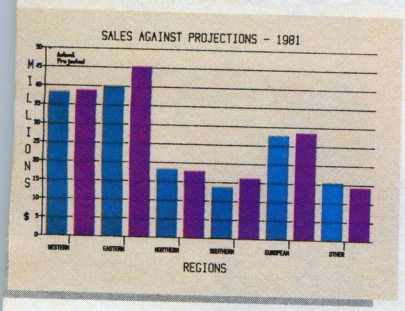

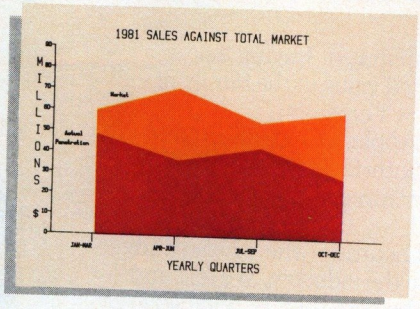

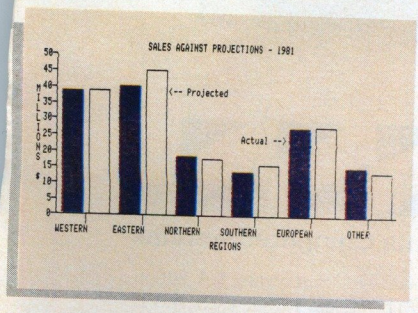

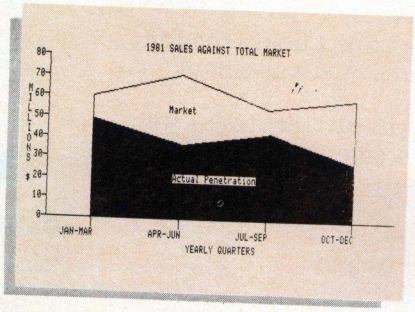

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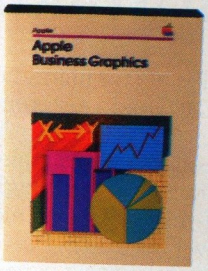

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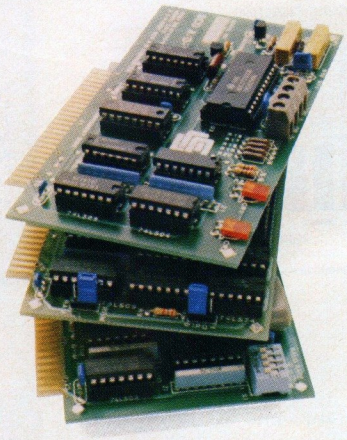

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Amp-L-Soft (Cont.)

```
092C:B1 83      353          LDA  (VARPNT),Y ;INTEGER LO
092E:8D 71 09   354          STA  POINT
0931:CE 71 09   355          DEC  POINT
0934:AD 71 09   356          LDA  POINT
0937:18         357          CLC                ;SET A1 BEFORE THE
0938:65 3C      358          ADC  A1            ;FIRST SUBSTRING
093A:85 3C      359          STA  A1            ;IN OBJECT TO
093C:A9 00      360          LDA  #0            ;TO COMPARE
093E:65 3D      361          ADC  A1+1
0940:85 3D      362          STA  A1+1
0942:C6 3C      363          DEC  A1
0944:D0 02      364          BNE  *+4
0946:C6 3D      365          DEC  A1+1
094B:           366 *
094B:20 BA FC   367 NEXT     JSR  NXTA1
094B:B0 13      368          BCS  MISS
094D:EE 71 09   369          INC  POINT
0950:A0 00      370          LDY  #0
0952:B1 3C      371 LOOP     LDA  (A1),Y
0954:D1 40      372          CMP  (A3),Y
0956:D0 F0      373          BNE  NEXT
0958:C8         374          INY
0959:CC 70 09   375          CPY  LTAR
095C:D0 F4      376          BNE  LOOP
095E:F0 05      377          BEQ  HIT
0960:           378 *
0960:           379 * RETURN POINT TO CALLER
0960:           380 * BUT AS A ZERO IF MISS
0960:           381 *
0960:A9 00      382 MISS     LDA  #0
0962:8D 71 09   383          STA  POINT
0965:A9 01      384 HIT      LDA  #1
0967:AD 71 09   385          LDA  POINT
096A:91 83      386          STA  (VARPNT),Y
096C:4C 95 D9   387          JMP  DATA          ;EXIT STATEMENT
096F:           388 *
096F:           389 *
096F:           390 *      DATA STORAGE
096F:           391 *
096F:           392 *
096F:           393 LOBJ     DS   1             ;LENGTH OF OJBECT
0970:           394 LTAR     DS   1             ;LENGTH OF TARGET
0971:           395 POINT    DS   1             ;POINTER PARAM
0972:           396 ********************************
0972:           397 *                              *
0972:           398 *          TONE&               *
0972:           399 *     BY PAUL IRWIN            *
0972:           400 *                              *
0972:           401 *   COPYRIGHT (C) 1982         *
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0972:           403 *   LINCOLN, MA. 01773         *
0972:           404 *  ALL  RIGHTS RESERVED        *
0972:           405 *                              *
0972:           406 *                              *
0972:           407 *                              *
0972:           408 * GENERATES A TONE ON THE     *
0972:           409 * APPLE'S BUILT-IN SPEAKER.   *
0972:           410 *                              *
0972:           411 * CALL SEQUENCE:               *
0972:           412 *          &N (P,D)            *
0972:           413 * WHERE                        *
0972:           414 *  &N( IS PARSED BY AMPERJUMP  *
0972:           415 *    P = PERIOD 0...255        *
0972:           416 *    D = DURATION 1...255      *
0972:           417 *                              *
0972:           418 ********************************
0972:           419 *
0972:           420 *
0972:           421 *     EQUATES
FCA8:           422 WAIT     EQU  $FCA8
0972:           423 *
0972:           424 *
0972:           425 *
0972:           426 *
0972:           427 *
0972:           428 * ROUTINE
0972:           429 *
0972:           430 * GET PERIOD AND DURATION PARAMS
0972:           431 *
0972:20 F8 E6   432          JSR  GETBYT
0975:8E A6 09   433          STX  PERIOD
0978:20 BE DE   434          JSR  CHKCOM
097B:20 F8 E6   435          JSR  GETBYT        ;DURATION
097E:8E A7 09   436          STX  DURATN
0981:           437 *
0981:           438 * A ZERO PERIOD MEANS REST NOTE
0981:           439 *
0981:AD A6 09   440          LDA  PERIOD
0984:D0 09      441          BNE  TONE
0986:AD A7 09   442          LDA  DURATN
0989:20 A8 FC   443          JSR  WAIT          ;DELAY FOR A REST NOTE
098C:4C 95 D9   444          JMP  DATA          ;THEN FINISHED
098F:           445 *
098F:           446 * A PERIOD > 0 MEANS A TONE NOTE
098F:           447 *
098F:AD 30 C0   448 TONE     LDA  $C030         ;TOGGLE SPEAKER
0992:88         449 TONE1    DEY
0993:D0 05      450          BNE  TONE2
0995:CE A7 09   451          DEC  DURATN
0998:F0 09      452          BEQ  TONE3
099A:CA         453 TONE2    DEX
099B:D0 F5      454          BNE  TONE1
099D:AE A6 09   455          LDX  PERIOD
09A0:4C 8F 09   456          JMP  TONE
09A3:4C 95 D9   457 TONE3    JMP  DATA          ;FINISHED
09A6:           458 *
09A6:           459 *
09A6:           460 * DATA STORAGE
09A6:           461 *
09A6:           462 PERIOD   DS   1
09A7:           463 DURATN   DS   1
09A8:           464 ********************************
09A8:           465 *                              *
09A8:           466 *          INPUT&              *
09A8:           467 *      BY PAUL IRWIN           *
09A8:           468 *                              *
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09A8:           472 *                              *
09A8:           473 *                              *
09A8:           474 *                              *
09A8:           475 *                              *
09A8:           476 * REPLACES THE STRING INPUT    *
09A8:           477 * IN APPLESOFT.  ALLOWS THE    *
09A8:           478 * USE OF QUOTES, COMMAS, AND   *
09A8:           479 * COLONS IN THE INPUT STRING   *
09A8:           480 * WITHOUT TRUNCATION.  ESCAPE  *
09A8:           481 * AND CONTROL SEQUENCES ARE    *
09A8:           482 * RETAINED.  USES KSW INPUT    *
09A8:           483 * HOOK; I.E. WORKS WITH DISK.  *
09A8:           484 *                              *
09A8:           485 * CALL SEQUENCE:               *
09A8:           486 *          &I (IN$)            *
09A8:           487 * WHERE                        *
09A8:           488 *   &I( IS PARSED BY AMPERJUMP*
09A8:           489 *   IN$ = STRING VARIABLE TO   *
09A8:           490 *         INPUT.               *
09A8:           491 *                              *
09A8:           492 ********************************
09A8:           493 *
09A8:           494 *
09A8:           495 *      EQUATES
09A8:           496 *
009D:           497 DSCTMP   EQU  $9D           ;NEW DESCRIPTOR
0200:           498 BUF      EQU  $0200         ;INPUT BUFFER
D52C:           499 INLIN    EQU  $D52C         ;INPUT TO BUF
E3D5:           500 STRINI   EQU  $E3D5         ;GET SPACE & DESCR
E5E2:           501 MOVSTR   EQU  $E5E2         ;Y,X, TO (FRESPC)
09A8:           502 *
09A8:           503 *
09A8:           504 *
09A8:           505 *
09A8:           506 *    ROUTINES
09A8:           507 *
09A8:           508 *
09A8:           509 * GET VARIABLE AND THE STRING
09A8:           510 *
09A8:20 E3 DF   511          JSR  PTRGET        ;GET STRING VAR
09AB:20 2C D5   512          JSR  INLIN         ;GET INPUT TO BUF
09AE:A2 FF      513          LDX  #$FF
09B0:E8         514 MAIN1    INX                ;FIND LENGTH
09B1:BD 00 02   515          LDA  BUF,X         ;OF STRING IN BUF
09B4:C9 00      516          CMP  #0
09B6:D0 F8      517          BNE  MAIN1
09B8:8A         518          TXA
09B9:           519 *
09B9:           520 * WITH LENGTH OF INPUT STRING IN
09B9:           521 * THE A-REG, PREPARE SPACE AND A
09B9:           522 * NEW DESCRIPTOR IN VARIABLE.
09B9:           523 *
09B9:20 D5 E3   524          JSR  STRINI        ;CREATE SPACE AND DESCR
09BC:A0 00      525          LDY  #0
09BE:A5 9D      526          LDA  DSCTMP
09C0:91 83      527          STA  (VARPNT),Y ;COPY DESCRIPTOR
09C2:C8         528          INY
09C3:A5 9E      529          LDA  DSCTMP+1
09C5:91 83      530          STA  (VARPNT),Y
09C7:C8         531          INY
09C8:A5 9F      532          LDA  DSCTMP+2
09CA:91 83      533          STA  (VARPNT),Y
09CC:           534 *
09CC:           535 * MOVE THE STRING FROM INPUT BUFFER
09CC:           536 * TO THE NEW STRING SPACE
09CC:           537 *
09CC:A5 9D      538          LDA  DSCTMP        ;LENGTH
09CE:A2 00      539          LDX  #>BUF         ;ADDR LOW
09D0:A0 02      540          LDY  #<BUF         ;ADDR HIGH
09D2:20 E2 E5   541          JSR  MOVSTR        ;BUF TO (FRESPC)
09D5:           542 *
09D5:           543 *
09D5:4C 95 D9   544          JMP  DATA          ; FINISH STATEMENT
09D8:           545 *
                546 ********************************
09D8:           547 *                              *
09D8:           548 *        T A G S O R T &       *
09D8:           549 *                              *
09D8:           550 *  ASSEMBLER: APPLE II VER 1.0 *
09D8:           551 *      AUTHOR: PAUL IRWIN      *
09D8:           552 *     WRITTEN: MARCH, 1981     *
09D8:           553 *                              *
09D8:           554 * THE QUICKSORT ALGORITHM USED *
09D8:           555 * ON VECTORS OF SORT KEYS AND  *
09D8:           556 * TAGS.  KEYS AND TAGS MUST    *
09D8:           557 * BE INITIALISED BEFORE THE    *
09D8:           558 * CALL; THEY ARE RETURNED IN   *
09D8:           559 * ASCENDING SEQUENCE.  TO CALL *
09D8:           560 * THE SORT USE THE AMPERSAND   *
09D8:           561 * FUNCTION FROM APPLESOFT:     *
09D8:           562 *                              *
09D8:           563 *        &A(S$,T%,F,L)         *
09D8:           564 * WHERE                        *
09D8:           565 * &A( IS PARSED BY AMPERSAND   *
09D8:           566 *     JUMP UTILITY: AMPERJUMP  *
09D8:           567 *  S$ = NAME OF SORT VECTOR    *
09D8:           568 *       SINGLE DIMENSION       *
09D8:           569 *  T% = NAME OF TAGS VECTOR    *
09D8:           570 *       SINGLE DIMENSION, INT  *
09D8:           571 *  F >= 1, THE FIRST ELEMENT   *
09D8:           572 *  L  = THE LAST ELEMENT       *
09D8:           573 *                              *
                574 ********************************
09D8:           575 *
09D8:           576 *          E Q U A T E S
09D8:           577 *
09D8:           578 * APPLESOFT USEAGE
09D8:           579 *
009B:           580 LOWTR    EQU  $009B
DEB8:           581 CHKCLS   EQU  $DEB8
F7D9:           582 GETARYPT EQU $F7D9
09D8:           583 *
09D8:           584 * QUICKSORT LOCAL USEAGE
09D8:           585 *
0000:           586 INDX     EQU  $00           ;USED BY POINT
```

continued on next page

C&H Best Sellers: Programs That Work!

Higher Text Extended

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The best just got better! Synergistic software produces an excellent program called "Higher Text II". It's our favorite program for adding text to a hi-res picture, or for producing textual display pic's when the standard Apple text just isn't sufficient. The problem is that Higher Text by itself is not particularly easy to use...necessity being the mother of invention, we set out to enhance the program. We produced some lightning-fast machine language routines to allow any apple user to easily and quickly take advantage of what the program has to offer. What we ended up with is the best and most flexible program of its kind at any price! Higher Text Extended, in conjunction with Higher Text II, allows you to add text to an existing pic or design textual display pics. Use all of the features of the original Higher Text II but in a very easy "user-friendly" environment. Provides instantaneous center, left, or right justification of text on a line-by-line basis. Prevents you from accidentally scrolling or destroying your pic. Presents you with several "menus" which list all of the available options...including: (1)List of all key commands, (2)List of background modes, (3)List of background colors, (4)List of character colors and (5)Selection of font styles...These menus are available at any time in the development of a pic. Provides temporary storage of your pic as it is being developed with instantaneous recall should you make an error. Incorporates extensive error-trapping to prevent the needless loss of time associated with pressing the wrong key or entering the wrong value. Allows you to change fonts at any time during the creation of a pic. Largely self-prompting with "Help" screens so there's no need for constant reference to the manual or easily misplaced reference cards. Requires 48K Apple II Plus (Applesoft in ROM), 1 or 2 disk drives, (DOS 3.3)

The Perfect Companion to The Slide Show!

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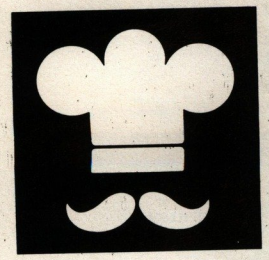

The Menu][

$39.95

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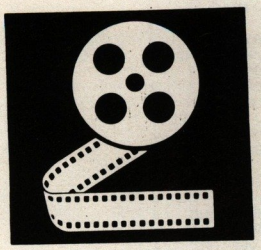
The MENU][stores your favorite recipes in any of 6 "user-defined" categories. You "browse" through the alphabetized recipe list in these categories, choosing your menu selections with a simple keystroke. You can write your menu for up to 2 weeks (42 meals); the rest is automatic! You can request a printed copy of your menu, your recipes (in any serving size up to 1,295 people) and an alphabetized shopping list of the ingredients needed to prepare the meals you've selected (a check list of misc. items can be added to the list with the touch of a button). The shopping list automatically combines "like" ingredients and adjusts each recipe for the number of people eating the meal. Recipes and menus can be changed, deleted, or added to at any time. Also included is a Special Meal/Party planner menu option, and 2 "user-defined" counters (calories, sodium intake, etc.) Since you won't be overbuying anymore, "THE MENU][may pay for itself on your very first shopping trip!

Operates with 1 or 2 disk drives (DOS 3.3). Requires 48K Apple, Disk Drive, and Printer. Written in APPLESOFT and MACHINE LANGUAGE.



The Slide Show

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Finally, high-res pics are more versatile than 35mm slides...and less expensive! The "slide" show allows you to use your high-res pics in a programmed sequence. Not another Graphics Package, but a versatile enhancement to all of the excellent Graphics Packages already available. Think of it as a standard slide show on your television with the advantage of "TV-like" special effect transitions between "slides." 20 different transitions (including: horizontal and vertical wipes, ripple effects, column wipes, etc.). Works with standard Apple pics. Includes the capability for producing a stand-along "Run-Time" package. Hi-res pics (slides) load in approximately 4 seconds. Supports single or multiple disc drives. Free run, timed, keypress or game button slide advance. User friendly. NOT copy protected! Compatible with NTSC TV signal processing hardware. Prints slide/transition listing. Written in Applesoft/Machine Language, 48K, 1 or more disk drives, printer optional. (DOS 3.3)

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```
0002:            587 DESCR   EQU  $02        ;USED BY POINT
0004:            588 TAGS    EQU  $04        ;USED BY POINT
0060:            589 IREC1   EQU  $60        ;INDEX LEFTMOST
0062:            590 DREC1   EQU  $62        ;POINTER TO DESCRIPTOR
0064:            591 TREC1   EQU  $64        ;POINTER TO TAG
0066:            592 IREC2   EQU  $66        ;INDEX RIGHTMOST
0068:            593 DREC2   EQU  $68        ;POINTER TO DESC.
006A:            594 TREC2   EQU  $6A        ;POINTER TO TAG
006C:            595 IREC3   EQU  $6C        ;INDEX CURSOR
006E:            596 DREC3   EQU  $6E        ;POINTER TO DESC.
0070:            597 TREC3   EQU  $70        ;POINTER TO TAG
0072:            598 IRECL   EQU  $72        ;INDEX LEFT CURSOR
0074:            599 DRECL   EQU  $74        ;POINTER TO DESC.
0076:            600 TRECL   EQU  $76        ;POINTER TO TAG
0078:            601 ITEMP   EQU  $78        ;INDEX TEMP STRING
007A:            602 DTEMP   EQU  $7A        ;POINTER TO DESC.
007C:            603 TTEMP   EQU  $7C        ;POINTER TO TAG
007E:            604 STRNG1  EQU  $7E        ;COMPARE STRING 1
0080:            605 STRNG2  EQU  $80        ;COMPARE STRING 2
0082:            606 ISTACK  EQU  $82        ;STACK INDEX
09D8:            607 *
09D8:            608 *
09D8:            609 *
09D8:            610 *        R O U T I N E S
09D8:            611 *
09D8:            612 *
                 613 ****************************
09D8:            614 *        MAIN LINE         *
                 615 ****************************
09D8:            616 * ENTER HERE FROM AMPERJUMP.
09D8:            617 * PICK UP THE PARAMETERS
09D8:            618 * STARTING AFTER &A( WITH
09D8:            619 * THE STRING VECTOR.
09D8:            620 *
09D8:20 D9 F7    621        JSR  GETARYPT
09DB:A5 9B       622        LDA  LOWTR      ;ADDRESS OF SORT
09DD:18          623        CLC             ;STRING ARRAY
09DE:69 07       624        ADC  #7
09E0:8D FD 0C    625        STA  SRTARY
09E3:A5 9C       626        LDA  LOWTR+1
09E5:69 00       627        ADC  #0
09E7:8D FE 0C    628        STA  SRTARY+1
09EA:20 B7 00    629        JSR  CHRGOT     ;CHECK FOR A COMMA
09ED:20 BE DE    630        JSR  CHKCOM     ;BETWEEN PARMS
09F0:20 D9 F7    631        JSR  GETARYPT
09F3:A5 9B       632        LDA  LOWTR      ;ADDRESS OF TAGS
09F5:18          633        CLC             ;INTEGER ARRAY
09F6:69 07       634        ADC  #7
09F8:8D 00 0D    635        STA  TAGARY
09FB:A5 9C       636        LDA  LOWTR+1
09FD:69 00       637        ADC  #0
09FF:8D 01 0D    638        STA  TAGARY+1
0A02:20 B7 00    639        JSR  CHRGOT     ;CHECK FOR A COMMA
0A05:20 BE DE    640        JSR  CHKCOM     ;BETWEEN PARMS
0A08:20 67 DD    641        JSR  FRMNUM
0A0B:20 52 E7    642        JSR  GETADR     ;FIRST ELEMENT NUMBER
0A0E:20 BE DE    643        JSR  CHKCOM     ;WITH COMMA
0A11:A5 50       644        LDA  LINNUM
0A13:8D 03 0D    645        STA  INDEX1
0A16:A5 51       646        LDA  LINNUM+1
0A18:8D 04 0D    647        STA  INDEX1+1
0A1B:20 B7 00    648        JSR  CHRGOT
0A1E:20 67 DD    649        JSR  FRMNUM
0A21:20 52 E7    650        JSR  GETADR     ;LAST ELEMENT NUMBER
0A24:20 BB DE    651        JSR  CHKCLS     ;WITH ')' CLOSE
0A27:A5 50       652        LDA  LINNUM
0A29:8D 06 0D    653        STA  INDEX2
0A2C:A5 51       654        LDA  LINNUM+1
0A2E:8D 07 0D    655        STA  INDEX2+1
0A31:20 95 D9    656        JSR  DATA       ;OK, ADVANCE TXTPTR
0A34:            657 *
0A34:            658 * PARAMETERS READ OK.  NOW
0A34:            659 * THE SORT IS CALLED AND
0A34:            660 * ITS PAGE ZERO NEEDS MANAGED.
0A34:            661 *
0A34:20 3E 0A    662        JSR  SAVEZ      ;SAVE PAGE ZERO
0A37:20 54 0A    663        JSR  TSORT      ;DO THE SORT
0A3A:20 49 0A    664        JSR  RESTZ      ;RESTORE PAGE ZERO
0A3D:60          665        RTS             ;.. TO APPLESOFT PROGRAM
0A3E:            666 *
                 667 ****************************
0A3E:            668 *  SAVE SOME OF PAGE ZERO   *
                 669 ****************************
0A3E:A2 3F       670 SAVEZ   LDX  #$3F
0A40:B5 60       671 SAVEZ1  LDA  IREC1,X
0A42:9D 0D 0D    672         STA  SAVEA,X
0A45:CA          673         DEX
0A46:10 F8       674         BPL  SAVEZ1
0A48:60          675         RTS
0A49:            676 *
                 677 ****************************
0A49:            678 * RESTORE SOME OF PAGE ZERO *
                 679 ****************************
0A49:A2 3F       680 RESTZ   LDX  #$3F
0A4B:BD 0D 0D    681 RESTZ1  LDA  SAVEA,X
0A4E:95 60       682         STA  IREC1,X
0A50:CA          683         DEX
0A51:10 F8       684         BPL  RESTZ1
0A53:60          685         RTS
0A54:            686 *
                 687 ****************************
0A54:            688 *          TAG SORT          *
                 689 ****************************
0A54:            690 *
0A54:            691 * THE TAG SORT IS CALLED ONLY
0A54:            692 * ONCE HERE; FROM THE MAIN LINE.
0A54:            693 *
0A54:AD 03 0D    694 TSORT   LDA  INDEX1     ; SET INDEXES
0A57:85 60       695         STA  IREC1      ;REC1 AND REC2
0A59:AD 04 0D    696         LDA  INDEX1+1   ;TO INDEX1
0A5C:85 61       697         STA  IREC1+1    ;AND INDEX2
0A5E:AD 06 0D    698         LDA  INDEX2     ;RESPECTIVELY.
0A61:85 66       699         STA  IREC2
0A63:AD 07 0D    700         LDA  INDEX2+1
0A66:85 67       701         STA  IREC2+1
0A68:A9 4D       702         LDA  #>STACKA   ;RESET STACK INDEX
0A6A:85 82       703         STA  ISTACK     ;TO TOP (STACKA)
0A6C:A9 0D       704         LDA  #<STACKA
0A6E:85 83       705         STA  ISTACK+1
0A70:            706 *
0A70:            707 * THE TAG SORT IS CALLED
0A70:            708 * RECURSIVELY HERE; FROM WITHIN.
0A70:            709 *
0A70:A5 60       710 SORT    LDA  IREC1      ;DO WHILE
0A72:38          711         SEC             ;IREC1 < IREC2
0A73:E5 66       712         SBC  IREC2
0A75:A5 61       713         LDA  IREC1+1
0A77:E5 67       714         SBC  IREC2+1
0A79:B0 2F       715         BCS  SORTX
0A7B:20 F9 0A    716         JSR  PART       ;FINDS IREC3
0A7E:            717 * FIRST, SORT LEFT PARTITION
0A7E:20 AB 0A    718         JSR  STACK      ;SAVE REC1,REC2,REC3
0A81:A5 6C       719         LDA  IREC3      ;SET REC2 <-- REC3 - 1
0A83:38          720         SEC
0A84:E9 01       721         SBC  #1
0A86:85 66       722         STA  IREC2
0A88:A5 6D       723         LDA  IREC3+1
0A8A:E9 00       724         SBC  #0
0A8C:85 67       725         STA  IREC2+1
0A8E:20 70 0A    726         JSR  SORT       ;REC1 TO (REC3-1)
0A91:20 D2 0A    727         JSR  UNSTACK
0A94:            728 * NEXT, SORT RIGHT PARTITION
0A94:20 AB 0A    729         JSR  STACK
0A97:A5 6C       730         LDA  IREC3      ;SET REC1 <-- REC3 + 1
0A99:18          731         CLC
0A9A:69 01       732         ADC  #1
0A9C:85 60       733         STA  IREC1
0A9E:A5 6D       734         LDA  IREC3+1
0AA0:69 00       735         ADC  #0
0AA2:85 61       736         STA  IREC1+1
0AA4:20 70 0A    737         JSR  SORT       ;(REC3+1) TO REC2
0AA7:20 D2 0A    738         JSR  UNSTACK
0AAA:60          739 SORTX   RTS             ;END DO WHILE
0AAB:            740 *
                 741 ****************************
0AAB:            742 *    STACK RECORD INDICES    *
                 743 ****************************
0AAB:A2 00       744 STACK   LDX  #0
0AAD:A5 60       745         LDA  IREC1
0AAF:81 82       746         STA  (ISTACK,X)
0AB1:E6 82       747         INC  ISTACK
0AB3:A5 61       748         LDA  IREC1+1
0AB5:81 82       749         STA  (ISTACK,X)
0AB7:E6 82       750         INC  ISTACK
0AB9:A5 66       751         LDA  IREC2
0ABB:81 82       752         STA  (ISTACK,X)
0ABD:E6 82       753         INC  ISTACK
0ABF:A5 67       754         LDA  IREC2+1
0AC1:81 82       755         STA  (ISTACK,X)
0AC3:E6 82       756         INC  ISTACK
0AC5:A5 6C       757         LDA  IREC3
0AC7:81 82       758         STA  (ISTACK,X)
0AC9:E6 82       759         INC  ISTACK
0ACB:A5 6D       760         LDA  IREC3+1
0ACD:81 82       761         STA  (ISTACK,X)
0ACF:E6 82       762         INC  ISTACK
0AD1:60          763         RTS
0AD2:            764 *
                 765 ****************************
0AD2:            766 *   UNSTACK RECORD INDICES   *
                 767 ****************************
0AD2:A2 00       768 UNSTACK LDX  #0
0AD4:C6 82       769         DEC  ISTACK
0AD6:A1 82       770         LDA  (ISTACK,X)
0AD8:85 6D       771         STA  IREC3+1
0ADA:C6 82       772         DEC  ISTACK
0ADC:A1 82       773         LDA  (ISTACK,X)
0ADE:85 6C       774         STA  IREC3
0AE0:C6 82       775         DEC  ISTACK
0AE2:A1 82       776         LDA  (ISTACK,X)
0AE4:85 67       777         STA  IREC2+1
0AE6:C6 82       778         DEC  ISTACK
0AE8:A1 82       779         LDA  (ISTACK,X)
0AEA:85 66       780         STA  IREC2
0AEC:C6 82       781         DEC  ISTACK
0AEE:A1 82       782         LDA  (ISTACK,X)
0AF0:85 61       783         STA  IREC1+1
0AF2:C6 82       784         DEC  ISTACK
0AF4:A1 82       785         LDA  (ISTACK,X)
0AF6:85 60       786         STA  IREC1
0AF8:60          787         RTS
                 788 ****************************
0AF9:            789 *   PARTITION R1,R2 AT R3    *
                 790 ****************************
0AF9:            791 *
0AF9:            792 * SETTING UP THE PARAMETERS
0AF9:            793 *
0AF9:A5 60       794 PART    LDA  IREC1      ;SET REC3 TO THE
0AFB:18          795         CLC             ;MEDIAN OF REC1 AND REC2
0AFC:65 66       796         ADC  IREC2      ;I.E. ADD IREC1 AND
0AFE:85 6C       797         STA  IREC3      ;IREC2 THEN DIVIDE
0B00:A5 61       798         LDA  IREC1+1    ;THE SUM BY TWO.
0B02:65 67       799         ADC  IREC2+1
0B04:85 6D       800         STA  IREC3+1
0B06:66 6D       801         ROR  IREC3+1
0B08:66 6C       802         ROR  IREC3
0B0A:A2 60       803         LDX  #IREC1
0B0C:20 57 0C    804         JSR  POINT2
0B0F:A2 6C       805         LDX  #IREC3
0B11:20 57 0C    806         JSR  POINT2
0B14:20 8F 0C    807         JSR  SWAPA      ;SWAP REC1 WITH REC3
0B17:A5 60       808         LDA  IREC1      ;SET RECL <-- REC1 + 1
0B19:18          809         CLC
0B1A:69 01       810         ADC  #1
0B1C:85 72       811         STA  IRECL
0B1E:A5 61       812         LDA  IREC1+1
0B20:69 00       813         ADC  #0
0B22:85 73       814         STA  IRECL+1
0B24:A5 66       815         LDA  IREC2      ;SET REC3 <--- REC2
0B26:85 6C       816         STA  IREC3
0B28:A5 67       817         LDA  IREC2+1
0B2A:85 6D       818         STA  IREC3+1
0B2C:            819 *
0B2C:            820 *    PARTITION DECISION
0B2C:            821 *
```

continued on next page

Amp-L-Soft (Cont.)

```
0B2C:A2 60      822 DECIDE  LDX  #IREC1     ;SET THE POINTERS
0B2E:20 57 0C   823         JSR  POINT2     ;FOR REC1, RECL, AND
0B31:A2 72      824         LDX  #IRECL     ;REC3.
0B33:20 57 0C   825         JSR  POINT2
0B36:A2 6C      826         LDX  #IREC3
0B38:20 57 0C   827         JSR  POINT2
0B3B:A9 00      828         LDA  #0
0B3D:8D 09 0D   829         STA  CASE
0B40:A5 72      830         LDA  IRECL      ;IF IRECL >= IREC3
0B42:18         831         CLC             ;THEN CASE = CASE + 1
0B43:E5 6C      832         SBC  IREC3
0B45:A5 73      833         LDA  IRECL+1
0B47:E5 6D      834         SBC  IREC3+1
0B49:90 03      835         BCC  DECIDE1
0B4B:EE 09 0D   836         INC  CASE
0B4E:A0 00      837 DECIDE1 LDY  #0         ;LENGTH <--
0B50:B1 62      838         LDA  (DREC1),Y  ;MINIMUM LENGTH
0B52:D1 6E      839         CMP  (DREC3),Y  ; OF (REC1,REC3)
0B54:90 02      840         BCC  DECIDE2
0B56:B1 6E      841         LDA  (DREC3),Y
0B58:8D 0B 0D   842 DECIDE2 STA  LENGTH
0B5B:C8         843         INY
0B5C:B1 62      844         LDA  (DREC1),Y  ;SET STRNG1 AS REC1
0B5E:85 7E      845         STA  STRNG1
0B60:B1 6E      846         LDA  (DREC3),Y
0B62:85 80      847         STA  STRNG2
0B64:C8         848         INY
0B65:B1 62      849         LDA  (DREC1),Y  ;SET STRNG2 AS REC3
0B67:85 7F      850         STA  STRNG1+1
0B69:B1 6E      851         LDA  (DREC3),Y
0B6B:85 81      852         STA  STRNG2+1
0B6D:A0 00      853         LDY  #0
0B6F:B1 7E      854 DECIDE3 LDA  (STRNG1),Y ;IF REC1 >= REC3
0B71:D1 80      855         CMP  (STRNG2),Y ;THEN CASE <-- CASE + 2
0B73:90 16      856         BCC  DECIDE5
0B75:D0 0E      857         BNE  DECIDE4
0B77:C8         858         INY
0B78:CC 0B 0D   859         CPY  LENGTH
0B7B:D0 F2      860         BNE  DECIDE3
0B7D:A0 00      861         LDY  #0
0B7F:B1 62      862         LDA  (DREC1),Y
0B81:D1 6E      863         CMP  (DREC3),Y
0B83:90 06      864         BCC  DECIDE5
0B85:EE 09 0D   865 DECIDE4 INC  CASE
0B88:EE 09 0D   866         INC  CASE
0B8B:A0 00      867 DECIDE5 LDY  #0         ;LENGTH <--
0B8D:B1 62      868         LDA  (DREC1),Y  ;MINIMUM LENGTH
0B8F:D1 74      869         CMP  (DRECL),Y  ; OF (REC1,RECL)
0B91:90 02      870         BCC  DECIDE6
0B93:B1 74      871         LDA  (DRECL),Y
0B95:8D 0B 0D   872 DECIDE6 STA  LENGTH
0B98:C8         873         INY
0B99:B1 62      874         LDA  (DREC1),Y  ;SET STRNG1 AS REC1
0B9B:85 7E      875         STA  STRNG1
0B9D:B1 74      876         LDA  (DRECL),Y
0B9F:85 80      877         STA  STRNG2
0BA1:C8         878         INY
0BA2:B1 62      879         LDA  (DREC1),Y  ;SET STRNG2 AS RECL
0BA4:85 7F      880         STA  STRNG1+1
0BA6:B1 74      881         LDA  (DRECL),Y
0BA8:85 81      882         STA  STRNG2+1
0BAA:A0 00      883         LDY  #0
0BAC:B1 80      884 DECIDE7 LDA  (STRNG2),Y ;IF RECL >= REC1
0BAE:D1 7E      885         CMP  (STRNG1),Y ;THEN CASE <-- CASE + 4
0BB0:90 1C      886         BCC  DECIDE9
0BB2:D0 0E      887         BNE  DECIDE8
0BB4:C8         888         INY
0BB5:CC 0B 0D   889         CPY  LENGTH
0BB8:D0 F2      890         BNE  DECIDE7
0BBA:A0 00      891         LDY  #0
0BBC:B1 74      892         LDA  (DRECL),Y
0BBE:D1 62      893         CMP  (DREC1),Y
0BC0:90 0C      894         BCC  DECIDE9
0BC2:EE 09 0D   895 DECIDE8 INC  CASE
0BC5:EE 09 0D   896         INC  CASE
0BC8:EE 09 0D   897         INC  CASE
0BCB:EE 09 0D   898         INC  CASE
0BCE:AD 09 0D   899 DECIDE9 LDA  CASE
0BD1:C9 07      900         CMP  #7
0BD3:D0 07      901         BNE  DECIDE10
0BD5:A9 03      902         LDA  #3
0BD7:8D 09 0D   903         STA  CASE
0BDA:D0 09      904         BNE  DECIDE11
0BDC:C9 05      905 DECIDE10 CMP #5
0BDE:D0 05      906         BNE  DECIDE11
0BE0:A9 01      907         LDA  #1
0BE2:8D 09 0D   908         STA  CASE
0BE5:EA         909 DECIDE11 NOP
0BE6:           910 *
0BE6:           911 *     PARTITION ACTION
0BE6:           912 *
0BE6:C9 00      913 ACTION0 CMP  #0
0BE8:D0 10      914         BNE  ACTION1
0BEA:A5 6C      915         LDA  IREC3
0BEC:38         916         SEC
0BED:E9 01      917         SBC  #1         ;IREC3 <-- IREC3 - 1
0BEF:85 6C      918         STA  IREC3
0BF1:A5 6D      919         LDA  IREC3+1
0BF3:E9 00      920         SBC  #0
0BF5:85 6D      921         STA  IREC3+1
0BF7:4C 2C 0B   922         JMP  DECIDE
0BFA:C9 01      923 ACTION1 CMP  #1
0BFC:D0 10      924         BNE  ACTION2
0BFE:A5 6C      925         LDA  IREC3
0C00:38         926         SEC
0C01:E9 01      927         SBC  #1         ;IREC3 <-- IREC3 - 1
0C03:85 6C      928         STA  IREC3
0C05:A5 6D      929         LDA  IREC3+1
0C07:E9 00      930         SBC  #0
0C09:85 6D      931         STA  IREC3+1
0C0B:4C 2C 0B   932         JMP  DECIDE
0C0E:C9 02      933 ACTION2 CMP  #2
0C10:D0 10      934         BNE  ACTION3
0C12:A5 72      935         LDA  IRECL
0C14:18         936         CLC
0C15:69 01      937         ADC  #1         ;IRECL <-- IRECL + 1
0C17:85 72      938         STA  IRECL
0C19:A5 73      939         LDA  IRECL+1
0C1B:69 00      940         ADC  #0
0C1D:85 73      941         STA  IRECL+1
0C1F:4C 2C 0B   942         JMP  DECIDE
0C22:C9 03      943 ACTION3 CMP  #3
0C24:D0 04      944         BNE  ACTION4
0C26:20 8F 0C   945         JSR  SWAPA      ;REC3 WITH REC1
0C29:60         946         RTS             ;EXIT OF PARTITION
0C2A:C9 04      947 ACTION4 CMP  #4
0C2C:D0 10      948         BNE  ACTION5
0C2E:A5 6C      949         LDA  IREC3
0C30:38         950         SEC
0C31:E9 01      951         SBC  #1
0C33:85 6C      952         STA  IREC3
0C35:A5 6D      953         LDA  IREC3+1
0C37:E9 00      954         SBC  #0
0C39:85 6D      955         STA  IREC3+1
0C3B:4C 2C 0B   956         JMP  DECIDE
0C3E:EA         957 ACTION5 NOP             ;NOT DEFINED
0C3F:C9 06      958 ACTION6 CMP  #6
0C41:D0 13      959         BNE  ACTION7
0C43:20 C6 0C   960         JSR  SWAPB      ;RECL WITH REC3
0C46:A5 6C      961         LDA  IREC3
0C48:38         962         SEC
0C49:E9 01      963         SBC  #1         ;IREC3 <-- IREC3 - 1
0C4B:85 6C      964         STA  IREC3
0C4D:A5 6D      965         LDA  IREC3+1
0C4F:E9 00      966         SBC  #0
0C51:85 6D      967         STA  IREC3+1
0C53:4C 2C 0B   968         JMP  DECIDE
0C56:00         969 ACTION7 BRK             ;THAT'S ALL OF THEM!
0C57:           970 *
                971 ****************************
0C57:           972 * SET POINTERS FROM INDICES  *
                973 ****************************
0C57:B5 00      974 POINT2  LDA  INDX,X     ;CALCULATES
0C59:18         975         CLC             ;DESCRIPTOR <---
0C5A:2A         976         ROLA ;             3*INDX + SRTARY
0C5B:95 02      977         STA  DESCR,X    ;AND
0C5D:95 04      978         STA  TAGS,X     ;TAGS <---
0C5F:B5 01      979         LDA  INDX+1,X   ;   2*INDX + TAGARY
0C61:2A         980         ROLA
0C62:95 03      981         STA  DESCR+1,X
0C64:95 05      982         STA  TAGS+1,X
0C66:B5 00      983         LDA  INDX,X
0C68:75 02      984         ADC  DESCR,X
0C6A:95 02      985         STA  DESCR,X
0C6C:B5 01      986         LDA  INDX+1,X
0C6E:75 03      987         ADC  DESCR+1,X
0C70:95 03      988         STA  DESCR+1,X
0C72:AD FD 0C   989         LDA  SRTARY
0C75:75 02      990         ADC  DESCR,X
0C77:95 02      991         STA  DESCR,X
0C79:AD FE 0C   992         LDA  SRTARY+1
0C7C:75 03      993         ADC  DESCR+1,X
0C7E:95 03      994         STA  DESCR+1,X
0C80:AD 00 0D   995         LDA  TAGARY
0C83:75 04      996         ADC  TAGS,X
0C85:95 04      997         STA  TAGS,X
0C87:AD 01 0D   998         LDA  TAGARY+1
0C8A:75 05      999         ADC  TAGS+1,X
0C8C:95 05      1000        STA  TAGS+1,X
0C8E:60         1001        RTS
0C8F:           1002 *
                1003 ****************************
0C8F:           1004 *     SWAP REC1 AND REC3     *
                1005 ****************************
0C8F:A0 00      1006 SWAPA  LDY  #0
0C91:B1 62      1007        LDA  (DREC1),Y
0C93:AA         1008        TAX
0C94:B1 6E      1009        LDA  (DREC3),Y  ; SWAP FIRST BYTE
0C96:91 62      1010        STA  (DREC1),Y  ; OF DESCRIPTORS:
0C98:8A         1011        TXA             ;THE STRING LENGTH
0C99:91 6E      1012        STA  (DREC3),Y
0C9B:B1 64      1013        LDA  (TREC1),Y
0C9D:AA         1014        TAX
0C9E:B1 70      1015        LDA  (TREC3),Y  ; SWAP FIRST BYTE
0CA0:91 64      1016        STA  (TREC1),Y  ; OF TAG DESCR:
0CA2:8A         1017        TXA             ; THE INTEGER (HI BYTE)
0CA3:91 70      1018        STA  (TREC3),Y
0CA5:C8         1019        INY
0CA6:B1 62      1020        LDA  (DREC1),Y
0CA8:AA         1021        TAX
0CA9:B1 6E      1022        LDA  (DREC3),Y  ; SWAP SECOND BYTE
0CAB:91 62      1023        STA  (DREC1),Y  ; OF DESCRIPTORS:
0CAD:8A         1024        TXA             ; STRING ADDRESS (HI BYTE)
0CAE:91 6E      1025        STA  (DREC3),Y
0CB0:B1 64      1026        LDA  (TREC1),Y
0CB2:AA         1027        TAX
0CB3:B1 70      1028        LDA  (TREC3),Y  ; SWAP SECOND BYTE
0CB5:91 64      1029        STA  (TREC1),Y  ; OF TAG DESCR:
0CB7:8A         1030        TXA             ; THE INTEGER (LO BYTE)
0CB8:91 70      1031        STA  (TREC3),Y
0CBA:C8         1032        INY
0CBB:B1 62      1033        LDA  (DREC1),Y
0CBD:AA         1034        TAX
0CBE:B1 6E      1035        LDA  (DREC3),Y  ; SWAP THIRD BYTE
0CC0:91 62      1036        STA  (DREC1),Y  ; OF DESCRIPTORS:
0CC2:8A         1037        TXA             ; STRING ADDRESS (LO BYTE)
0CC3:91 6E      1038        STA  (DREC3),Y
0CC5:60         1039        RTS
0CC6:           1040 *
                1041 ****************************
0CC6:           1042 *     SWAP RECL AND REC3     *
                1043 ****************************
0CC6:A0 00      1044 SWAPB  LDY  #0
0CC8:B1 74      1045        LDA  (DRECL),Y
0CCA:AA         1046        TAX
0CCB:B1 6E      1047        LDA  (DREC3),Y  ; SWAP FIRST BYTE
0CCD:91 74      1048        STA  (DRECL),Y  ; OF DESCRIPTORS:
0CCF:8A         1049        TXA             ;THE STRING LENGTH
0CD0:91 6E      1050        STA  (DREC3),Y
0CD2:B1 76      1051        LDA  (TRECL),Y
0CD4:AA         1052        TAX
0CD5:B1 70      1053        LDA  (TREC3),Y  ; SWAP FIRST BYTE
0CD7:91 76      1054        STA  (TRECL),Y  ; OF TAG DESCR:
0CD9:8A         1055        TXA             ; THE INTEGER (HI BYTE)
```

```
0CDA:91 70      1056          STA  (TREC3),Y
0CDC:C8         1057          INY
0CDD:B1 74      1058          LDA  (DRECL),Y
0CDF:AA         1059          TAX
0CE0:B1 6E      1060          LDA  (DREC3),Y ; SWAP SECOND BYTE
0CE2:91 74      1061          STA  (DRECL),Y ; OF DESCRIPTORS:
0CE4:8A         1062          TXA            ; STRING ADDRESS (HI BYTE)
0CE5:91 6E      1063          STA  (DREC3),Y
0CE7:B1 76      1064          LDA  (TRECL),Y
0CE9:AA         1065          TAX
0CEA:B1 70      1066          LDA  (TREC3),Y ; SWAP SECOND BYTE
0CEC:91 76      1067          STA  (TRECL),Y ; OF TAG DESCR:
0CEE:8A         1068          TXA            ; THE INTEGER (LO BYTE)
0CEF:91 70      1069          STA  (TREC3),Y
0CF1:C8         1070          INY
0CF2:B1 74      1071          LDA  (DRECL),Y
0CF4:AA         1072          TAX
0CF5:B1 6E      1073          LDA  (DREC3),Y ; SWAP THIRD BYTE
0CF7:91 74      1074          STA  (DRECL),Y ; OF DESCRIPTORS:
0CF9:8A         1075          TXA            ; STRING ADDRESS (LO BYTE)
0CFA:91 6E      1076          STA  (DREC3),Y
0CFC:60         1077          RTS
0CFD:           1078 *
0CFD:           1079 *
0CFD:           1080 *    D A T A   S T O R A G E
0CFD:           1081 *
0CFD:           1082 *
0CFD:           1083 *
0CFD:           1084 * WORKING STORAGE FOR PARMS
0CFD:           1085 *
0CFD:           1086 SRTARY  DS   3          ;SORT ARRAY ADDRESS
0D00:           1087 TAGARY  DS   3          ;TAGS ARRAY ADDRESS
0D03:           1088 INDEX1  DS   3          ;FIRST ELEMENT OF SORT
0D06:           1089 INDEX2  DS   3          ;LAST ELEMENT OF SORT
0D09:           1090 CASE    DS   2
0D0B:           1091 LENGTH  DS   2
0D0D:           1092 *
0D0D:           1093 SAVEA   DS   $40        ;PAGE ZERO SAVE AREA
0D4D:           1094 STACKA  DS   $100       ;PARMS STACK AREA
0E4D:00         1095          BRK

*** SUCCESSFUL ASSEMBLY: NO ERRORS
```

```
SOURCE FILE: LOADER
0000:            1 ******************************
0000:            2 *        LOADER              *
0000:            3 *     BY PAUL IRWIN          *
0000:            4 *                            *
0000:            5 *   COPYRIGHT (C) 1982       *
0000:            6 *   BY MICRO-SPARC INC       *
0000:            7 *   LINCOLN, MA. 01773       *
0000:            8 *  ALL RIGHTS  RESERVED      *
0000:            9 *APPLE DOS TOOL KIT ASSEMBLER*
0000:           10 ******************************
0000:           11 *                            *
0000:           12 * ROUTINE TO LOAD AND CONNECT*
0000:           13 * THE AMPERSAND ROUTINES WITH*
0000:           14 * AN EXISTING PROGRAM.       *
0000:           15 *                            *
0000:           16 * FROM APPLESOFT, CALL BEFORE*
0000:           17 * ANY VARIABLES OR ARRAYS ARE*
0000:           18 * REFERENCED. USE COMMANDS:  *
0000:           19 *                            *
0000:           20 *    BLOAD,AMPER MASTER      *
0000:           21 *    CALL 18256              *
0000:           22 *                            *
0000:           23 * FINAL POSITION OF ROUTINES *
0000:           24 * IS IN $80C.EFF AREA, WITH  *
0000:           25 * USER PROGRAM RELOCATED TO  *
0000:           26 * START AT $F01.             *
0000:           27 *                            *
0000:           28 * THE LOADER RELOCATES THE   *
0000:           29 * CODE FROM $480C DOWN TO A  *
0000:           30 * STARTING ADDRESS OF $80C.  *
0000:           31 *                            *
0000:           32 ******************************
0000:           33 *       EQUATES              *
003C:           34 A1       EQU  $3C        ;MOVE BEGIN
003E:           35 A2       EQU  $3E        ;MOVE END
0042:           36 A4       EQU  $42        ;MOVE DESTIN
0050:           37 LINNUM   EQU  $50        ;INTEGER
005E:           38 INDEX    EQU  $5E        ;INTEGER
0067:           39 TXTTAB   EQU  $67        ;START PROG
0069:           40 VARTAB   EQU  $69        ;START VARS
0079:           41 NXTPTR   EQU  $79        ;NEXT STMT
0094:           42 HIGHDS   EQU  $94        ;USED BY BLTU
0096:           43 HIGHTR   EQU  $96        ;USED BY BLTU
00AF:           44 PRGEND   EQU  $AF        ;PROG END
00B8:           45 TXTPTR   EQU  $B8        ;TEXT PTR
080C:           46 INIT     EQU  $080C      ;& RESIDENCE
0F00:           47 NUPROG   EQU  $0F00      ;DESTIN PROG
480C:           48 ILOAD    EQU  $480C      ;RELOC START
4DFF:           49 ELOAD    EQU  $4DFF      ;RELOC END
D3C3:           50 BLT2     EQU  $D3C3      ;PART OF BLTU
D66C:           51 CLEARC   EQU  $D66C      ;CLEAR VAR/STACK
FE2C:           52 MOVE     EQU  $FE2C      ;MONITOR MOVE
----- NEXT OBJECT FILE NAME IS LOADER.OBJ0
4750:           53          ORG  $4750
4750:           54 *
4750:           55 *
4750:           56 *    ROUTINES
4750:           57 *
4750:           58 *
4750:           59 *
4750:           60 * MOVE PROGRAM FROM PRESENT LOCATION
4750:           61 * TO ADDRESS IN NUPROG.
4750:           62 *
4750:A9 0F      63          LDA  #<NUPROG   ;KONZEN'S SEQ
4752:85 51      64          STA  LINNUM+1   ;USED TO MOVE PROG
4754:A9 00      65          LDA  #>NUPROG   ;TEXT UPWARD IN MEM
4756:85 50      66          STA  LINNUM     ;BY CALLING BLT2
4758:A5 67      67          LDA  TXTTAB
```

```
475A:85 96      68          STA  HIGHTR
475C:A5 B0      69          LDA  PRGEND+1   ;REF APPLE ORCHARD
475E:85 97      70          STA  HIGHTR+1   ;ISSUE #1
4760:C6 96      71          DEC  HIGHTR
4762:38         72          SEC
4763:A5 50      73          LDA  LINNUM
4765:85 94      74          STA  HIGHDS
4767:E5 67      75          SBC  TXTTAB
4769:85 50      76          STA  LINNUM
476B:A5 51      77          LDA  LINNUM+1
476D:85 95      78          STA  HIGHDS+1
476F:E5 68      79          SBC  TXTTAB+1
4771:85 51      80          STA  LINNUM+1
4773:A5 AF      81          LDA  PRGEND
4775:E5 67      82          SBC  TXTTAB
4777:A8         83          TAY
4778:A5 B0      84          LDA  PRGEND+1
477A:E5 68      85          SBC  TXTTAB+1
477C:AA         86          TAX
477D:18         87          CLC
477E:65 95      88          ADC  HIGHDS+1
4780:85 95      89          STA  HIGHDS+1
4782:C8         90          INY
4783:D0 01      91          BNE  *+3
4785:E8         92          INX
4786:E8         93          INX
4787:C8         94          INY
478B:20 C3 D3   95          JSR  BLT2       ;DOES THE MOVE
478B:           96 *
478B:           97 * ADJUST APPLSOFT POINTERS
478B:           98 *
478B:A2 69      99          LDX  #VARTAB
478D:20 EE 47  100          JSR  ADD
4790:A2 AF     101          LDX  #PRGEND
4792:20 EE 47  102          JSR  ADD
4795:A2 67     103          LDX  #TXTTAB
4797:20 EE 47  104          JSR  ADD
479A:A2 B8     105          LDX  #TXTPTR
479C:A5 B9     106          LDA  TXTPTR+1
479E:C9 02     107          CMP  #2
47A0:F0 03     108          BEQ  *+5
47A2:20 EE 47  109          JSR  ADD
47A5:A6 79     110          LDX  NXTPTR
47A7:20 EE 47  111          JSR  ADD
47AA:          112 *
47AA:          113 * ADJUST NEXT LINE ADDRESSES
47AA:          114 * IN PROGRAM TEXT
47AA:          115 *
47AA:          116          LDA  TXTTAB
47AC:85 5E     117          STA  INDEX
47AE:A5 68     118          LDA  TXTTAB+1
47B0:85 5F     119          STA  INDEX+1
47B2:A0 00     120 LOAD1    LDY  #0
47B4:38        121          SEC
47B5:B1 5E     122          LDA  (INDEX),Y
47B7:65 50     123          ADC  LINNUM
47B9:91 5E     124          STA  (INDEX),Y
47BB:AA        125          TAX
47BC:C8        126          INY
47BD:B1 5E     127          LDA  (INDEX),Y
47BF:F0 0A     128          BEQ  LOAD2
47C1:65 51     129          ADC  LINNUM+1
47C3:91 5E     130          STA  (INDEX),Y
47C5:86 5E     131          STX  INDEX      ;POINT TO NEXT
47C7:85 5F     132          STA  INDEX+1
47C9:90 E7     133          BCC  LOAD1      ;LINE ALWAYS
47CB:          134 *
47CB:          135 *
47CB:          136 * PROGRAM TEXT OK - NOW RELOCATE
47CB:          137 * THE AMPERSAND ROUTINES
47CB:          138 *
47CB:A9 0C     139 LOAD2    LDA  #>INIT
47CD:85 42     140          STA  A4
47CF:A9 08     141          LDA  #<INIT
47D1:85 43     142          STA  A4+1
47D3:A9 0C     143          LDA  #>ILOAD
47D5:85 3C     144          STA  A1
47D7:A9 48     145          LDA  #<ILOAD
47D9:85 3D     146          STA  A1+1
47DB:A9 FF     147          LDA  #>ELOAD
47DD:85 3E     148          STA  A2
47DF:A9 4D     149          LDA  #<ELOAD
47E1:85 3F     150          STA  A2+1
47E3:A0 00     151          LDY  #0
47E5:20 2C FE  152          JSR  MOVE       ;TO INIT
47E8:          153 *
47E8:          154 * INITIALIZE THE & HOOK
47E8:          155 *
47E8:20 0C 08  156          JSR  INIT       ;IN AMPERJUMP
47EB:4C 6C D6  157          JMP  CLEARC     ;ASOFT CLEANS UP
47EE:          158 *
47EE:          159 * ADD LINNUM +1 TO PAGE ZERO
47EE:          160 * POINTER GIVEN BY X-REG.
47EE:          161 *
47EE:38        162 ADD      SEC
47EF:B5 00     163          LDA  $00,X
47F1:65 50     164          ADC  LINNUM
47F3:95 00     165          STA  $00,X
47F5:B5 01     166          LDA  $01,X
47F7:65 51     167          ADC  LINNUM+1
47F9:95 01     168          STA  $01,X
47FB:60        169          RTS

*** SUCCESSFUL ASSEMBLY: NO ERRORS
```

Chances are, when you bought your first disk drive, it was an Apple. Now that you're ready for a second, take a look at Quentin.

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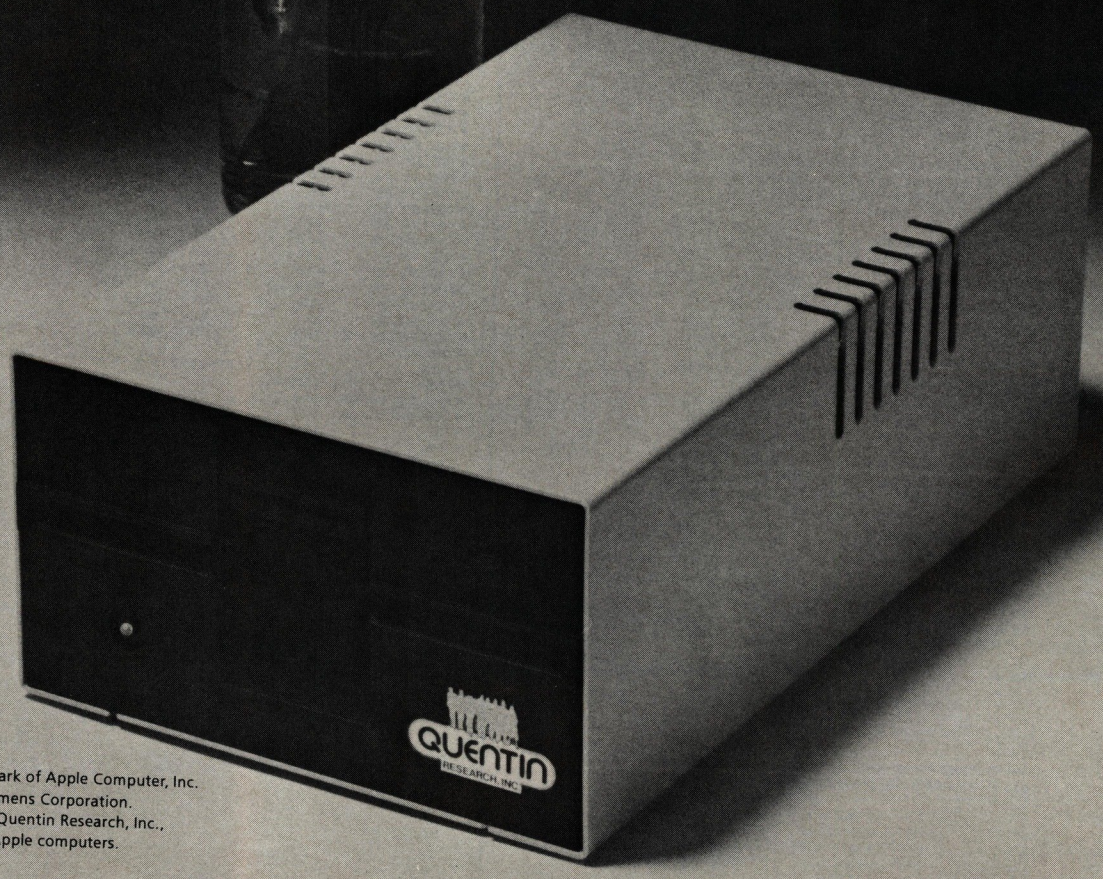

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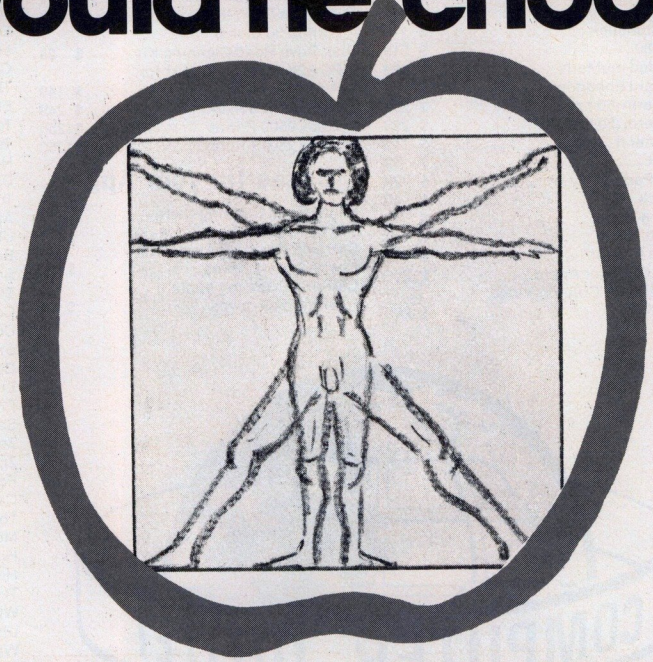
If Leonardo were here what medium for expression would he choose?



The Skyman 2001 Printer Interface with the Apple II™

Leonardo would want the complete capabilities of the Skyman 2001:

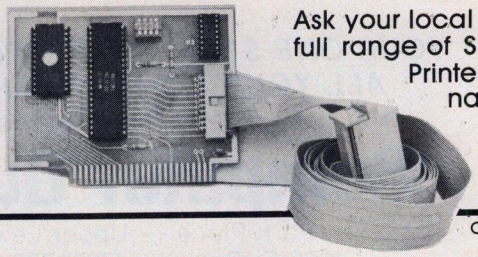
- 16 types of graphic dumps
- zoom graphics - select a portion of the graphic and enlarge it
- two screens - dump both, either or parts of both
- decimal mode
- choice of rotation or no rotation of dumps

and for his non-graphics expression:

- Custom Characters - generator, editor & 3 predesigned sets
- mixing of text and graphics
- CP/M ™ and Pascal Compatibility
- upper and lower case modes
- 15 simple commands to underline, condense, elongate emphasize etc.
- Tab functions

Even though his brilliance is well known, he would appreciate the demo disk and 48″ cable that are included, as well as the variety of printers he could use: C. Itoh, Epson, NEC, Centronics, Okidata 82 and 83A. And the simple SKYMAN installation - it just slips into your Apple II.™

Best of all, Leonardo could afford the low price of the SKYMAN 2001 - and you can too.



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Apple Electronic Message Center

Electronic Message Center (E.M.C.)

by Rudy A. Guy
1114 W. 22nd Street
Erie, PA 16502

How many times have you found yourself standing in front of a terminal in an airport or a bus station watching a continuous flow of information on departure and arrival schedules? How about the cable television information channel? Have you found yourself watching endless scheduling notes and public service announcements? Now comes the big question: have you ever priced one of these "Message Center" systems? If you have, you know that the price is way out of the ball park for most individuals and institutions. But, since you have had the foresight (I assume) to own an Apple computer, a limited Electronic Message Center is only a few hours of key pounding away.

Electronic Message Center (E.M.C.) is written in Applesoft BASIC and requires at least 32K and one disk drive. Even though it is not as elaborate as some of the higher priced "systems", E.M.C. will get the job done at a fraction of the cost.

E.M.C. was developed at the request of a local high school teacher. It was his idea to have important notices and announcements displayed throughout the day on several different terminals. You can also use E.M.C. in your home or office for passing along messages and announcements to your family or associates. It's flexible, eye-catching, and fun.

My initial attempt was rather crude, as it did not allow for entry of commas, colons, or other forbidden characters within a message. Further, there was no way to select an individual group of messages — they were all added to one file. The final shortcoming was the lack of a formatting routine for displaying the messages. Happily, each one of these limitations has been overcome in the final E.M.C. and you'll find the solutions to be of value in your own programming efforts.

GETTING STARTED

When E.M.C. is run, the user will be presented with the program's main menu. From here it is possible to:

1. **LOAD & DISPLAY A FILE**
2. **ADD TO A FILE**
3. **ADD A NEW FILE**
4. **CHANGE A FILE**
5. **DELETE A FILE**
6. **REVIEW NAME-FILE**
7. **EXIT PROGRAM**

Since we are dealing with the initial run of E.M.C., it would be wise to select **option 3, ADD A NEW FILE**. I know that there will be those of you who will try one of the other options first just to see if the program will bomb. Well, go ahead and try. All that you will get is a **NO TITLES IN FILE** message and the program will return to the main menu. So, let's get back to option 3 **(lines 3000 - 3170)** and see how a new file is added.

The first item that the user will be prompted for is a **new file name of not more than ten characters in length**. Once this name is entered, the program checks for a duplicate file so that an older file will not be overwritten. If no duplicate is found, you will be prompted for your **message** of **up to 224 characters**. So that you wont' have to guess if your message is too long, 224 underline characters will be displayed. Should an entry go beyond this length, an error message will be given and you will have to reenter the message. E.M.C. contains a text formatting routine for displaying the messages, so **you do not have to be concerned about words being split between lines** when messages are displayed. This formatting routine will be described later in the article.

INPUT ANYTHING

At this point in the program there is a subroutine that may be of interest, a BASIC **"Input Anything"** routine **(lines 8000 - 8070)**. Rather than add on a machine language routine to allow input of forbidden characters, such as the comma and the colon, I opted to use an already existent feature of the Apple, **the keyboard buffer**.

Anytime that data is entered into the Apple via the keyboard, it is placed in the **keyboard buffer** which is located from decimal **memory location 512 through 767 ($200-2FF)**. To get the input from the program into this buffer, it is necessary to call the **GETLN** subroutine in the Monitor which is located at **$FD6A (-662)**. As soon as a **carriage return** is entered, the **GETLN** subroutine will terminate and program execution returns to BASIC **line 8020**. At this point each memory location is PEEKed, through the use of a loop, for the character value that it contains. If the value of the memory location does not equal **141**, a carriage return, its character equivalent is added to **ST$**. If a carriage return is encountered, the loop is exited and program execution returns the add module at **line 3090** where **ME$(MC)** is made equivalent to **ST$**.

The final bit of data that will be requested is a **date**, in the form, **MM/DD/YY**. (This is an optional item and may be omitted by entering a carriage return.) When all the data has been entered, you will be prompted to verify the data you have supplied. E.M.C. is designed to handle a **maximum of 100 messages**, but if this number is too small, it may be increased by changing the **DIM** statements in **line 120**.

ADDING TO AN EXISTING FILE

If it becomes necessary to add more messages to an existing file, **option 2** should be selected from the main menu. You will be prompted for the file to be accessed, the new message and the date. When all data has been entered, the new message will be added to the end of the message file. Since **E.M.C. uses sequential files**, this addition was made through the use of the DOS **"APPEND"** command. **If you are still using DOS 3.2 or 3.2.1, there is an error in the APPEND command which could cause some problems.** To alleviate this problem **in DOS 3.2 systems**, the following changes should be made to E.M.C.:

(ADD)

```
105 POKE 778,168: POKE 779,0:
    POKE 780,32: POKE 781,237:
    POKE 782,253
```

(CHANGE)

```
2100 PRINT CHR$ (4)"APPEND "A$:
     PRINT CHR$ (4)"WRITE "A$:
     PRINT ME$(MC): PRINT MD$(MC):
     CALL 778: PRINT:
     PRINT CHR$ (4)"CLOSE"
```

This fix should take care of any problems. (Note: For more information on this fix, please refer to the International Apple Core's APNOTE of March 15, 1980.)

CHANGE A FILE

In order to **modify an existing file**, select **option 4** from the program menu. You will be prompted for the file that you wish to change. When this selection has been made, a modified **"Input Anything"** routine **(lines 9000-9120)** will read the file from the disk. Once all the messages have been read into memory, each will be displayed to the screen. You may elect to modify the message, leave the message unchanged, or purge the message from the file. When all changes have been made to the messages, the file will be rewritten, in corrected form, to the disk.

DELETE A FILE & REVIEW FILE NAMES

Option 5 permits the **deletion of any file** from the disk. You are prompted for the file name that is to be deleted. If the name entered is an existing file name, you will have to confirm your decision to delete the file by entering **"DEL"**. If an incorrect response is given at this point, you will be returned to the program menu.

Option 6, as implied by the menu, will display all message files currently stored in the **TITLES** text file. This option will display **38 titles, 2 columns of 19 names**, at a time to the screen.

DISPLAYING THE MESSAGES

When **option 1** is selected, and you select the file to be displayed, one of the strongest routines in the program is put to work — the **print formatter**. This routine, when used correctly, will eliminate the notorious split words which so often creep into text portions of programs. **Two variables must be set** before the formatting routine is accessed; they are **LM (left margin)** and **RM (*right margin*)**. **RM** must be set equal to the width of the screen; in this program the value is **32**. The following is a line by line description of how the routine works:

10010 Check to see if **A$** is less than width of screen; if it is, print **A$** and return.

10020 Set up descending loop, maximum length to **1**.

10030 Set **C$** equal to the **J** element of **A$** and check for punctuation or a space. If **C$** is a space or a punctuation mark then jump out of loop to **line 10050**.

continued on next page

Electronic Message Center (E.M.C.) (Cont.)

10040 Decrement counter by **NEXT** command.

10050 **If C$ is a space,** eliminate it and set A1$ = LEFT$(A$, J-1) and A$ = to remainder of original A$. Go to print routine.

10060 **If C$ is a punctuation mark** and it is in the maximum position (RM-LM=J) then go check for the next character (10130). If the next character is a space then set A1$=LEFT$(A$,J) and A$ = to remainder of original A$ minus one character. Print A1$ and go to 10100.

10070 No space or punctuation encountered. The line must be broken at maximum length.

10080 Defaults here if no punctuation or space is encountered and there is no more string to check. Go to final print routine at 10110.

10090 Print A1$ when no space or punctuation is found.

10100 Check to see if there is more of A$ to be formatted. If yes then go to start of new loop at line 10020.

10110 Formatting complete. Print A$ at HTAB LM.

10120 Jump out of subroutine; the job is done.

10130 Part of the routine to check for the type of character following a punctuation mark. If the remaining portion of A$ is shorter than or equal to the screen width, no check is needed. Go back to print routine in 10060.

10140 If next character is not a space then set A1$ = LEFT$(A$,J) and A$ = to the remainder of the original A$. Print A1$ but keep cursor on same line to avoid auto line feed at end of line. Jump out of subroutine and see if there is more to be formatted.

10150 Next character is a space, so return to 10060.

The complete file selected by the user is read into memory, so the disk will only be accessed at the beginning of the routine. The messages selected to be displayed will loop endlessly if so desired. **To terminate the display mode, a Control-C will get you back to the program menu.**

As with any program there is always a way of making it better adapted to its environment. One possible change, for those with real-time clocks, would be to eliminate the date and replace it with the current time of day. As I indicated earlier, E.M.C. is not as elaborate as the high priced message center, but the price can't be beaten.

Amp-L-Soft, Electronic Message Center, and Apple Bowl Football are available on diskette for an introductory price of $19.95 plus $1.50 shipping/handling ($2.50 outside the U.S.) from NIBBLE, P.O. Box 325, Lincoln, MA 01773. Offer expires Jan. 31, 1983.

```
10  REM   *********************
20  REM   *        EMC        *
30  REM   * BY RUDY A. GUY   *
40  REM   * COPYRIGHT (C) 1982 *
50  REM   * BY MICRO-SPARC INC *
60  REM   * LINCOLN, MA. 01773 *
70  REM   *********************
100  POKE 768,104: POKE 769,168: POKE 770,104: POKE 771,166:
     POKE 772,223: POKE 773,154: POKE 774,72: POKE 775,152: POKE
     776,72: POKE 777,96
110  ONERR  GOTO 32000
120  DIM TI$(100),ME$(100),MD$(100)
130  TEXT : HOME : INVERSE : PRINT "+++++++": FOR I = 1 TO 2
     2: PRINT "+     +": NEXT : PRINT "+++++++";: VTAB 1
140  VTAB 8: HTAB 2: PRINT "+++++": VTAB 10: HTAB 3: PRINT "
     EMC": VTAB 12: HTAB 3: PRINT "BY:": VTAB 14: HTAB 2: PRINT "
     R.GUY": VTAB 16: HTAB 2: PRINT "++++++"
150  VTAB 1: FOR I = 8 TO 40: HTAB I: PRINT "+";: NEXT
160  FOR I = 2 TO 23: VTAB I: HTAB 40: PRINT "+";: NEXT
170  VTAB 24: FOR I = 8 TO 39: HTAB I: PRINT "+";: NEXT
180  POKE 2039,43
190  NORMAL : POKE 32,7: POKE 33,32: POKE 34,1: POKE 35,23:
     HOME
200  VTAB 4:A$ = "<<MAIN MENU>>": GOSUB 11000: VTAB 22:A$ =
     "(C) 1982 MICRO-SPARC,INC.": GOSUB 11000: VTAB 5
210  RESTORE : FOR I = 1 TO 7: READ A$(I): PRINT :A$ = A$(I)
     : GOSUB 11000: NEXT
220  PRINT : PRINT " SELECT ONE OF THE ABOVE:";: GET A$: PRI
     NT A$: IF A$ < "1" OR A$ > "7" THEN  HOME : GOTO 200
230 A =  VAL (A$): ON A GOSUB 1000,2000,3000,4000,5000,6000,
     7000
240  TEXT : HOME : CLEAR : GOTO 110
1000  REM :::DISPLAY FILE:::
1010  HOME : VTAB 12: PRINT " FILE NAME :";: FOR I = 1 TO 10
     : PRINT  CHR$ (95);: NEXT : PRINT : VTAB 12: HTAB 13: INPUT
     "";A$: IF A$ = "" THEN  RETURN
1020  IF  LEN (A$) > 10 THEN 1000
1030  IF FL = 1 THEN FL = 0: GOTO 1050
1040  GOSUB 15000
1050  FOR I = 1 TO CZ - 1: IF A$ = TI$(I) THEN 1080
1060  NEXT : HOME : VTAB 12: PRINT " THAT FILE DOES NOT EXIS
     T.": PRINT : PRINT " TRY AGAIN ";: INPUT YN$: IF  LEFT$ (YN$
     ,1) = "Y" THEN FL = 1: GOTO 1010
1070  RETURN
1080  GOSUB 9000
1090  POKE 35,21
1100  HOME : VTAB 22: INVERSE : PRINT "----------------------
     -----------";: VTAB 23: PRINT "
       ";: SPEED= 140: NORMAL
1110  POKE 232,3
1120  FOR I = 1 TO MC - 1:A$ = ME$(I)
1130  INVERSE : VTAB 23: PRINT " ITEM # "I;: HTAB 16: PRINT
     "DATE :";: IF MD$(I) = "" THEN  PRINT "        ";: GOTO 1160
1140  IF  LEN (MD$(I)) < 8 THEN MD$(I) = " " + MD$(I): GOTO
     1140
1150  HTAB 31 -  LEN (MD$(I)): PRINT MD$(I);
1160  NORMAL
1170 LM = 2:RM = 32
1180  FOR J = 0 TO 8: VTAB  PEEK (232) + J: HTAB 1: CALL  -
     868: FOR L = 1 TO 100: NEXT : NEXT : VTAB  PEEK (232)
1190  GOSUB 10000
1200  IF  PEEK (232) = 3 THEN  POKE 232,12: GOTO 1220
1210  IF  PEEK (232) = 12 THEN  POKE 232,3
1220  NEXT
1230  FOR I = 1 TO 3000: NEXT
1240  FOR I = 21 TO 2 STEP  - 1: VTAB I: HTAB 1: CALL  - 868
     : FOR J = 1 TO 100: NEXT : NEXT
1250  GOTO 1100
2000  REM :::ADD TO FILE:::
2010  HOME : VTAB 12: PRINT " FILE NAME :";: FOR I = 1 TO 10
     : PRINT  CHR$ (95);: NEXT : PRINT : VTAB 12: HTAB 13: INPUT
     "";A$: IF A$ = "" THEN  RETURN
2020  IF  LEN (A$) > 10 THEN 2000
2030  IF FL = 1 THEN FL = 0: GOTO 2050
2040  GOSUB 15000
2050  FOR I = 1 TO CZ - 1: IF A$ = TI$(I) THEN 2080
2060  NEXT : HOME : VTAB 12: PRINT " THAT FILE DOES NOT EXIS
     T.": PRINT : PRINT " TRY AGAIN ";: INPUT YN$: IF  LEFT$ (YN$
     ,1) = "Y" THEN FL = 1: GOTO 2000
2070  RETURN
2080 AD = 1: HOME : GOSUB 3090
2090  PRINT : PRINT " IS THIS CORRECT ";: INPUT YN$: IF  LEF
     T$ (YN$,1) = "N" THEN 2080
2100  PRINT  CHR$ (4)"APPEND "A$: PRINT  CHR$ (4)"WRITE "A$:
      PRINT ME$(MC): PRINT MD$(MC): PRINT  CHR$ (4)"CLOSE"
2110  PRINT : PRINT " ANOTHER ";: INPUT YN$: IF  LEFT$ (YN$,
     1) = "N" THEN AD = 0: RETURN
2120  HOME : GOSUB 3090: GOTO 2090
3000  REM :::ADD NEW FILE:::
3010  GOSUB 15000: REM  READ NAME FILE
3020  HOME
3030  VTAB 3: PRINT " FILE NAME :";: FOR I = 1 TO 10: PRINT
      CHR$ (95);: NEXT : PRINT : VTAB 3: HTAB 13: INPUT "";TI$(CZ
     + 1): IF  LEN (TI$(CZ + 1)) > 10 THEN  HOME : GOTO 3030
3040  IF TI$(CZ + 1) = "" THEN 3170
3050 MC = 1
3060  IF CZ = 0 THEN 3090
3070  FOR I = 1 TO CZ: IF TI$(CZ + 1) = TI$(I) THEN  HOME :
     VTAB 12:A$ = "THAT TITLE ALREADY EXISTS.": GOSUB 11000: FOR
     I = 1 TO 3000: NEXT : GOTO 3020
3080  NEXT
3090  INVERSE : VTAB 5: HTAB 2: PRINT "ENTER MESSAGE :": NOR
     MAL : PRINT : FOR I = 1 TO 224: PRINT  CHR$ (95);: NEXT : PR
     INT : VTAB 7: HTAB 1: GOSUB 8000:ME$(MC) = ST$
3100  VTAB 15: PRINT " DATE (MM/DD/YY) :";: FOR I = 1 TO 8:
     PRINT  CHR$ (95);: NEXT : PRINT : VTAB 15: HTAB 19: INPUT ""
     ;MD$(MC)
3120  IF AD = 1 THEN  RETURN
3130  PRINT : INPUT " IS THIS CORRECT ?";YN$: IF  LEFT$ (YN$
     ,1) = "N" THEN  HOME : GOTO 3090
3140  PRINT : PRINT " ANOTHER ?";: INPUT "";YN$: IF  LEFT$ (
     YN$,1) = "Y" THEN MC = MC + 1: HOME : GOTO 3090
3150  PRINT  CHR$ (4)"OPEN "TI$(CZ + 1): PRINT  CHR$ (4)"WRI
     TE "TI$(CZ + 1): FOR I = 1 TO MC: PRINT ME$(I): PRINT MD$(I)
     : NEXT : PRINT  CHR$ (4)"CLOSE"
3160  PRINT  CHR$ (4)"OPEN TITLES": PRINT  CHR$ (4)"POSITION
      TITLES,R"CZ - 1: PRINT  CHR$ (4)"WRITE TITLES": PRINT TI$(C
     Z + 1): PRINT "***": PRINT  CHR$ (4)"CLOSE"
3170  RETURN
4000  REM :::CHANGE A FILE:::
4010  HOME : VTAB 12: PRINT " FILE NAME :";: FOR I = 1 TO 10
     : PRINT  CHR$ (95);: NEXT : PRINT : VTAB 12: HTAB 13: INPUT
     "";A$: IF A$ = "" THEN  RETURN
4020  IF  LEN (A$) > 10 THEN 4000
4030  IF FL = 1 THEN FL = 0: GOTO 4060
4040  GOSUB 15000
4050 FI$ = A$
4060  FOR I = 1 TO CZ - 1: IF A$ = TI$(I) THEN 4090
4070  NEXT : HOME : VTAB 12: PRINT " THAT FILE DOES NOT EXIS
     T.": PRINT : PRINT " TRY AGAIN ";: INPUT YN$: IF  LEFT$ (YN$
     ,1) = "Y" THEN FL = 1: GOTO 4000
4080  RETURN
4090  GOSUB 9000
4100  FOR I = 1 TO MC - 1:A$ = ME$(I)
4110  HOME : VTAB 3: PRINT " ITEM #";I: PRINT :LM = 2:RM = 3
     2: GOSUB 10000: PRINT : PRINT " DATE :"MD$(I)
4120  VTAB 17: PRINT " CHANGE :": PRINT " (D)ATE (M)ESSAGE (
     P)URGE": PRINT " (N)EXT": VTAB  PEEK (37) - 2: HTAB 10: GET
     YN$: PRINT YN$
4130  IF YN$ = "N" THEN 4180
4140 CH = 1
4150  IF YN$ = "D" THEN 4260
4160  IF YN$ = "P" THEN 4330
4170  IF YN$ = "M" THEN 4290
4180  IF MC = 1 THEN 4210
4190  IF I >  = MC - 1 THEN 4210
```

```
4200  NEXT
4210 A$ = FI$: IF CH = 0 THEN 4240
4220  PRINT  CHR$ (4)"DELETE "A$: PRINT  CHR$ (4)"OPEN "A$:
     PRINT  CHR$ (4)"WRITE "A$
4230  FOR I = 1 TO MC - 1: PRINT ME$(I): PRINT MD$(I): NEXT
     : PRINT  CHR$ (4)"CLOSE"
4240  VTAB 15: CALL  - 958: PRINT " CHANGE ANOTHER";: INPUT
     YN$: IF  LEFT$ (YN$,1) = "Y" THEN  HOME :CH = 0: GOTO 4000
4250  RETURN

4260  VTAB 15: CALL  - 958: PRINT " DATE (MM/DD/YY) :";: FOR
      J = 1 TO 8: PRINT  CHR$ (95);: NEXT : VTAB 15: HTAB 19: INP
     UT "";MD$(I)
4270  IF  LEN (MD$(I)) > 8 THEN  VTAB 7: CALL  - 958: GOTO 4
     260
4280 A$ = ME$(I): GOTO 4110
4290  VTAB 13: CALL  - 958: PRINT " MESSAGE :": VTAB 15: FOR
      J = 1 TO 224: PRINT  CHR$ (95);: NEXT : VTAB 15: GOSUB 8000
4300  IF  LEN (ST$) = 1 THEN A$ = ME$(I): GOTO 4320
4310 ME$(I) = ST$:A$ = ST$
4320  GOTO 4110
4330  VTAB 17: CALL  - 958: PRINT " ENTER 'DEL' TO CONFIRM :
     ";: INPUT "";YN$: IF YN$ <  > "DEL" THEN 4110
4340  IF I = MC THEN MC = MC - 1: GOTO 4200
4350  FOR J = I TO MC - 1
4360 ME$(J) = ME$(J + 1):MD$(J) = MD$(J + 1): NEXT
4370 MC = MC - 1
4380 A$ = ME$(I)
4390  IF I >  = MC THEN 4180
4400  GOTO 4110
5000  REM :::DELETE FILE:::
5010  HOME : VTAB 12: PRINT " ENTER FILE TO BE DELETED :": P
     RINT : HTAB 10: FOR I = 1 TO 10: PRINT  CHR$ (95);: NEXT : P
     RINT : VTAB 14: HTAB 10: INPUT "";A$
5020  IF A$ = "" THEN  RETURN
5030  IF  LEN (A$) > 10 THEN 5010
5040  GOSUB 15000
5050  FOR I = 1 TO CZ - 1: IF A$ = TI$(I) THEN 5090
5060  NEXT
5070  HOME : VTAB 12: PRINT " UNABLE TO MATCH THAT NAME.": P
     RINT : PRINT " TRY AGAIN ?";: INPUT "";YN$: IF  LEFT$ (YN$,1
     ) = "Y" THEN 5000
5080  RETURN
5090  PRINT : PRINT " ENTER 'DEL' TO DELETE FILE.": PRINT :
     HTAB 10: INPUT YN$: IF YN$ <  > "DEL" THEN  RETURN
5100  HOME : VTAB 12: HTAB 5: INVERSE : PRINT "FILE BEING DE
     LETED.": NORMAL
5110  IF I = CZ - 1 AND I = 1 THEN  PRINT  CHR$ (4)"DELETE T
     ITLES": PRINT  CHR$ (4)"DELETE "A$: RETURN
5120  FOR J = I TO CZ - 1:TI$(J) = TI$(J + 1): NEXT
5130  PRINT  CHR$ (4)"DELETE TITLES": PRINT  CHR$ (4)"OPEN T
     ITLES": PRINT  CHR$ (4)"WRITE TITLES": FOR I = 1 TO CZ - 1:
     PRINT TI$(I): NEXT : PRINT  CHR$ (4)"CLOSE"
5140  PRINT  CHR$ (4)"DELETE "A$
5150  PRINT : PRINT " FILE DELETED, DO ANOTHER ?";: INPUT ""
     ;YN$: IF  LEFT$ (YN$,1) = "Y" THEN 5000
5160  RETURN
6000  REM :::VIEW NAMES:::
6010  GOSUB 15000
6020 B = 1: HOME
6030  FOR I = B TO CZ - 1

6040  IF I < 10 THEN  HTAB 2
6050  IF  PEEK (37) < 22 THEN  PRINT I". "TI$(I): GOTO 6070
6060  GOTO 6090
6070  NEXT
6080  GET A$: PRINT A$: RETURN
6090 J = I:I = CZ - 1: IF J = I THEN 6150
6100  VTAB 2
6110  FOR I = J TO CZ - 1
6120  HTAB 16: IF  PEEK (37) < 22 THEN  PRINT I". "TI$(I): G
     OTO 6140
6130  GOTO 6150
6140  NEXT : HTAB 16: GET A$: PRINT A$: RETURN
6150  HTAB 16: GET A$: PRINT A$
6160 B = I:I = CZ - 1: IF B = I THEN 6140
6170  HOME : GOTO 6030
7000  TEXT : HOME : END
8000  REM :::INPUT ROUTINE:::
8010 ST$ = "": CALL  - 662
8020  FOR J = 512 TO 736:X =  PEEK (J)
8030  IF X = 141 THEN 8060
8040 ST$ = ST$ +  CHR$ (X - 128)
8050  NEXT : IF  LEN (ST$) > 224 THEN  PRINT : PRINT  CHR$ (
     7)" TOO LONG!": FOR J = 1 TO 3000: NEXT : HOME : POP : GOTO
     3070
8060  IF ST$ = "" THEN  POP : HOME : GOTO 3070
8070  RETURN
9000  REM :::READ MESSAGES:::
9010 MC = 1
9020  PRINT  CHR$ (4)"OPEN "A$: PRINT  CHR$ (4)"READ "A$
9030 ST$ = ""
9040  CALL  - 662
9050  FOR I = 512 TO 736:X =  PEEK (I): IF X = 141 THEN 9090
9060  IF X > 141 THEN X = X - 128
9070 ST$ = ST$ +  CHR$ (X)
9080  NEXT
9090 ME$(MC) = ST$: INPUT MD$(MC):MC = MC + 1
9100  GOTO 9030
9110  PRINT  CHR$ (4)"CLOSE"
9120  RETURN
10000  REM :::::PRINT FORMATTER
10010  IF  LEN (A$) <  = RM - LM THEN  PRINT A$: RETURN
10020  FOR J = RM - LM TO 1 STEP  - 1
10030 C$ =  MID$ (A$,J,1): IF C$ = " " OR C$ = "." OR C$ = "
     ," OR C$ = "!" OR C$ = "?" OR C$ = "-" THEN 10050
10040  NEXT :J = RM - LM
10050  IF C$ = " " THEN A1$ =  LEFT$ (A$,J - 1):A$ =  RIGHT$
     (A$, LEN (A$) - J): GOTO 10090
10060  IF C$ = "!" OR C$ = "," OR C$ = "." OR C$ = "?" OR C$
      = "-" AND J = RM - LM THEN  GOSUB 10130:A1$ =  LEFT$ (A$,J)
     :A$ =  RIGHT$ (A$, LEN (A$) - J - 1): HTAB LM: PRINT A1$: GO
     TO 10100
10070 A1$ =  LEFT$ (A$,J): IF  LEN (A$) <  >  LEN (A1$) THEN
      A$ =  RIGHT$ (A$, LEN (A$) - J): GOTO 10090
10080  GOTO 10110
10090  HTAB LM: PRINT A1$
10100  IF  LEN (A$) > RM - LM THEN 10020
10110  HTAB LM: PRINT A$
10120  RETURN
10130  IF J =  LEN (A$) THEN  RETURN
10140  IF  MID$ (A$,J + 1,1) <  > " " THEN A1$ =  LEFT$ (A$,
     J):A$ =  RIGHT$ (A$, LEN (A$) - J): HTAB LM: PRINT A1$;: POP
     : GOTO 10100
10150  RETURN
11000  PRINT  TAB( ((32) -  LEN (A$)) / 2)A$: RETURN
12000  DATA  "1. LOAD & DISPLAY FILE","2. ADD TO A FILE
     ","3. ADD A NEW FILE     ","4. CHANGE A FILE      ","5. DEL
     ETE A FILE      ","6. VIEW NAME-FILE     ","7. EXIT PROGRAM
     "
15000  REM :::READ TITLES FILE:::
15010 CZ = 1
15020  PRINT  CHR$ (4)"OPEN TITLES": PRINT  CHR$ (4)"READ TI
     TLES"
15030  INPUT TI$(CZ): IF TI$(CZ) = "***" THEN 15050
15040 CZ = CZ + 1: GOTO 15030
15050  PRINT  CHR$ (4)"CLOSE"
15060  RETURN
32000  REM :::ERROR ROUTINE:::
32010 ER =  PEEK (222):EL =  PEEK (218) +  PEEK (219) * 256
32020  CALL 768
32030  IF ER = 5 AND EL = 15030 AND A <  > 3 THEN  PRINT : P
     RINT  CHR$ (4)"CLOSE": HOME : VTAB 12:A$ = "NO TITLES IN FIL
     E.": GOSUB 11000: FOR I = 1 TO 4000: NEXT : POP : RETURN
32040  IF ER = 5 AND EL = 15030 THEN  PRINT : PRINT  CHR$ (4
     )"CLOSE":ER = 1: GOTO 15060
32050  IF ER = 5 AND EL = 9040 OR EL = 9100 THEN  PRINT : GO
     TO 9110
32060  IF ER = 22 AND EL > 10000 THEN  RESUME
32070  IF ER = 255 THEN  SPEED= 255: GOTO 130
32080  HOME
32090  IF ER = 9 THEN  PRINT "DISK FULL!": END
32100  IF ER = 10 THEN  PRINT "FILE IS LOCKED!": END
32110  IF ER = 8 THEN  PRINT "DISK I/O ERROR!": END
32120  IF ER = 4 THEN  PRINT "REMOVE WRITE PROTECT TAB!": EN
     D
```


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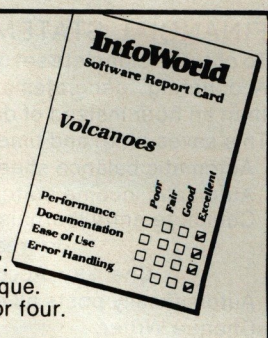

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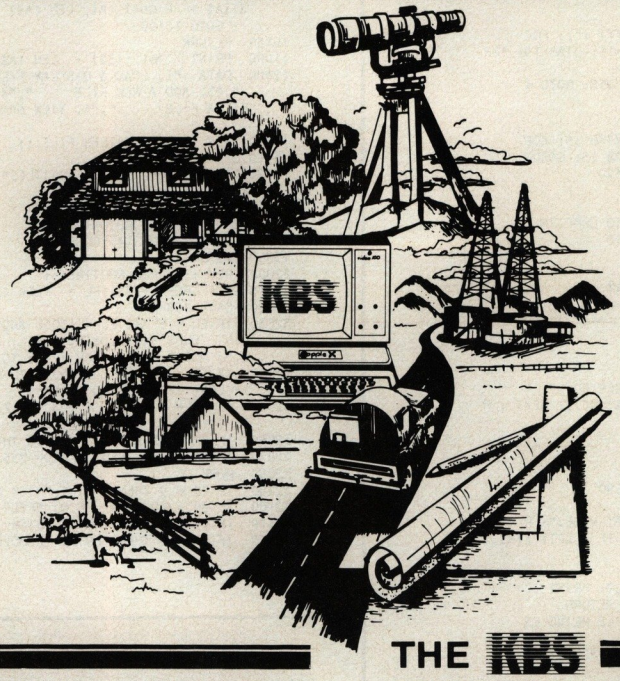

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PRODUCTS — INSIDE AND OUT

DATA PLOT — A Graphing Program From Muse

by Leslie R. Schmeltz
3224 Magnolia Ct.
Bettendorf, IA 52722

Have you ever wanted to create elaborate colored graphs with your Apple II? Perhaps some data you have developed just cries out for graphic representation, but your programming skills are not equal to the task. Even if you are capable of creating your own graphs, have you figured out how to label, multiply plot and then print the results? The folks at Muse Software have. According to the ads in computer magazines, several other companies have also discovered the process and are offering their own graphing utility programs. This review will be confined to the Muse offering, but no doubt other reviewers will be sharing their impressions of competing systems.

DATA PLOT allows the user to create a variety of graphic displays. Data or actual graphic displays may be saved on disk and recalled later to be displayed or modified. This program requires a 48K Apple II or Apple II Plus, Applesoft ROM and Disk II. A dual DOS configuration, used for all recently shipped Muse products, allows the program to be booted directly on either DOS 3.2 or 3.3 systems.

FEATURES

Selecting **option 1** from the two item menu displayed on booting the program disk runs a **demonstration** of all the graphing capabilities of the program. **Option 2** selects the DATA PLOT program itself.

The DATA PLOT program menu allows the user to load a file from disk, clear a file from memory, create or edit a data file, plot data, save a data file to disk, print a graph, access the disk utilities or quit. A line at the bottom of the video display shows the name of the file currently in memory. The main menu provides access to several sub-menus which allow the user to select the features desired.

LOAD/CLEAR

LOAD/CLEAR provides the means to load a previously created disk file into memory or clear the memory of whatever data it presently contains. Selecting this option displays a directory of all files on the disk and prompts the user to enter the name of the file desired. Memory may be cleared by pressing RETURN in response to the file name prompt.

EDIT/CREATE

EDIT/CREATE allows the user to examine and modify data presently in memory or create an entirely new data file. A file identification page allows input of titles for the **X** and **Y** axes and a name for the file itself. Titles for **X** and **Y** axes then head a data page used to enter the desired data. The editing process is much the same as initial entry, except that information presently in the file is displayed on both pages and the user is given an opportunity to change desired items. Newly created or edited files may be stored on disk by selecting the SAVE option from the main menu.

continued on next page

The Pizza Program

Announcing the first dinner menu planning system. It will save you time and add new zest to your meals. It may even convince your wife buying an Apple* was a stroke of genius.

ENDS HO-HUM DINNERS

Are you tired of the same old thing for dinner? Would you like more variety in your evening meal? Is there something you'd rather have but don't get very often? The Pizza Program is designed just for you. It's a delightful new software package designed to end the dinner-blahs with computer generated menus. Here is how it works.

You review what you like from the pre-selected food groups in the system. Delete any foods you don't enjoy. Add anything new at any time. Then decide how often you like to eat certain items. For example. Don't like liver? Then eliminate it with a few simple keystrokes. Or, you can plan for it as seldom as once every 99 weeks or as often as daily.

Want to go out to your favorite restaurant? Enter the restaurant's name as a "Main Course." Now your computer will automatically remind you to go out to eat — and as often as you select. It will delete all other items from that meal except the name of the restaurant.

AUTOMATIC SHOPPING LIST

You get a new menu each week or for just a few days if you want. And, it generates a detailed shopping list, automatically. It can arrange each item on the list in sequence according to the aisles at your favorite store. Studies show a shopping list will discourage impulse buying and save you money.

Also, it generates a per serving calorie counter. This is easy to delete anytime you are not in a diet mood or want to celebrate for any reason. You never count calories unless you want to.

RANDOMLY DELICIOUS

Say goodby to boring meals. Your computer will remember variety is the spice of life. This system makes eating at home a pleasure again. Each menu is randomly generated from major food groups according to the specific criteria you select. The system is easy to learn and easy to operate. Yet it is a sophisticated piece of software which will prevent menu mix-ups.

It will add a new dimension to your home meals without increasing your food costs. It is rumored The Pizza Program may actually reduce the climbing divorce rate. Husbands now have something to look forward to for dinner. Wives think it is terrific because it saves time and effort. And, kids love anything computerized. This is a useful and practical application you'll appreciate day after day, week after week.

TRY IT FOR 30 DAYS WITHOUT RISK

This tested system is guaranteed to make your life easier and happier. Our home trial lets you actually use The Pizza Program for a full 30 days before you decide to keep it. Watch the fun and convenience it creates. Enjoy better meals and see how much time it saves. If you are not satisfied for any reason, return it within 1 month for a prompt and courteous refund. Your investment is just $34.50 plus $2.00 for shipping and handling. (California residents add 6½% sales tax.) Full documentation is included.

OUT OF THE RUT

One housewife's reaction to this program is typical. She wrote, "Before using your system I found myself getting into a rut of serving the same things over and over. The Pizza Program has changed all of this for me. We now have a wider variety of dinners and best of all I don't have to decide what they will be. If this was all it did, I'd be thrilled. But it isn't. The shopping list I receive along with my menus has been such a time saver. I quickly run through it and delete anything I feel I don't need and add something I might. I would have a hard time going back to doing my menus by hand."

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DATA PLOT — A Graphing Program From Muse (Cont.)

PLOTTING

Selecting PLOT from the main menu displays the Plot Options page. From this menu, the user may choose a **bar plot**, **line plot**, **scatter diagram** or **pie chart**. The background grid may be toggled on-off and multiple plotting selected from the same menu. **99 data points** may be plotted for all but the pie chart, which is limited to 25. Multiple bar, line or scatter graphs may be overlayed for comparative data displays.

Additional labelling, placed at user specified **X** and **Y** coordinates, may be added to any graph. A **statistics option** permits display of the mean and standard deviation of the Y variable. Any graph created on the screen may be saved and later displayed as a 'picture', particularly helpful in the case of a complex multiple plot.

Printed copies of a plot or data file are available to users of TRENDCOM 200 or SILENTYPE printers. TRENDCOM users may also elect to print a double size plot.

DISK UTILITIES

The DISK UTILITIES provide for renaming or deleting a data file, and initialization or copying a data disk. Like most other Muse programs, DATA PLOT can load and save files only on disks initialized with the program disk. Copying data files requires two disk drives.

The 41 page documentation booklet thoroughly explains all program operations and includes a fairly complete trouble shooting guide. An extended disk replacement policy has just been announced by Muse . . . worn or damaged disks will be replaced for $10 as long as the program is published.

IMPRESSIONS

You get an immediate clue that DATA PLOT is going to be an interesting program while viewing the demonstration routine. Four complete graphs, in color no less, are simultaneously displayed first. The demo then proceeds to ably illustrate the other functions available.

Use of DATA PLOT is made considerably easier by the **excellent documentation** furnished. Concise instructions, accompanied by screen photographs, guide you every step of the way. I found myself able to create virtually any type of plot desired in a very short time. Creating user oriented documentation is currently receiving a great deal of attention at Muse. If the material included with DATA PLOT is any indication of what is to follow, the efforts are paying off handsomely.

Recently my brother-in-law and I set out to graph some comparative data he was using in his work as a process chemist. Within a half hour or so, we had an impressive multiple line plot drawn, scaled, and labelled. Alas, my printer could not produce the hard copy he desired to present to some clients the next morning. As an experiment, we tried photographing the color screen display with a Polaroid SX-70. The pictures we obtained were most impressive. If you are inclined to try this method, remember to darken the room, rest the camera on something steady and use a fairly long exposure.

PRINTER AND OTHER LIMITATIONS

Gripes? A few. Frankly, I'm surprised Muse neglected to make provisions for other graphics capable printers owned by Apple users. More than a few Paper Tiger, Epson, and Spinwriter (to mention only a few) owners may be very unhappy about this oversight. If it's any comfort, the documentation mentions that you MAY be able to design your own software routine to print the screen! It may be useful to use LexiCom from Micro-Sparc, Inc. to transfer your Data Plot pictures to standard Apple disks, where you can use them in your own programs or with commercially available screen dump software.

The PICTURE SHOW routine will display complete plots, as mentioned earlier. This capability alone could whet the appetite of anyone interested in using the Apple as an A-V tool. Unfortunately, each plot must be selected individually. Adding provisions for displaying a pre-specified list of pictures, switching from one to the next by pressing RETURN or ESC, would make this routine a dynamic method of adding graphic data to any presentation.

Several programs that I use regularly could certainly benefit from the graphing capabilities provided by DATA PLOT. No provisions are made, however, to use data files from other programs or add some of the DATA PLOT features to your own programs. While I recognize the need for piracy prevention, making some allowances for the legitimate program buyer to extend the usefulness of his purchase should be considered.

SUMMARY

DATA PLOT is advertised as a graphing program for the Apple and, as such, does a remarkably good job. Professional looking graphs are easily constructed and displayed. The quality of the program and documentation are in keeping with the usual high standards set by Muse.

If you have a great deal of data that would benefit from graphing, by all means consider this program. Those seeking to add graphing capability to their own data files or programs may have to look further.

DATA PLOT sells for $59.95 and is published by:

Muse Software
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Baltimore, MD 21201

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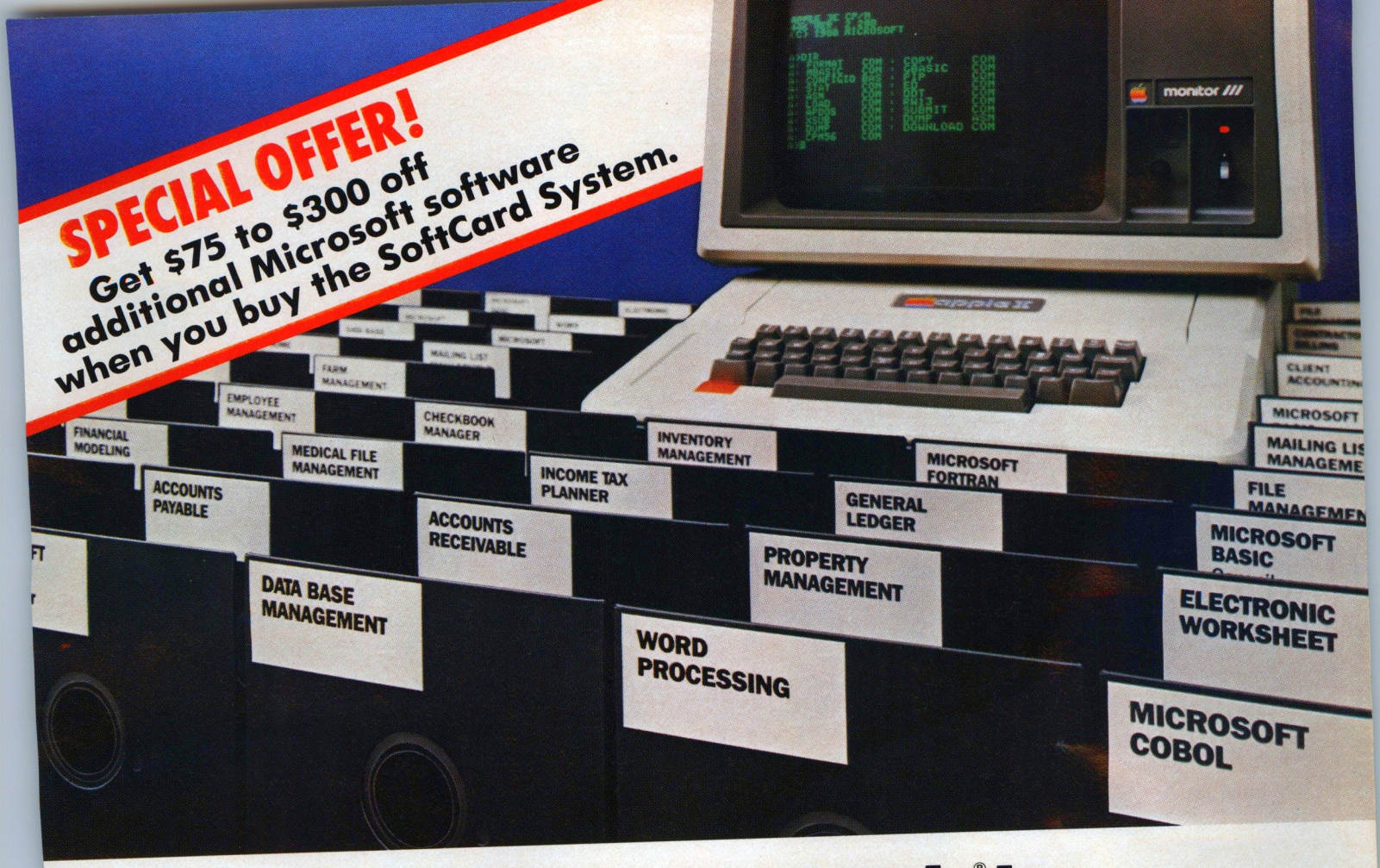

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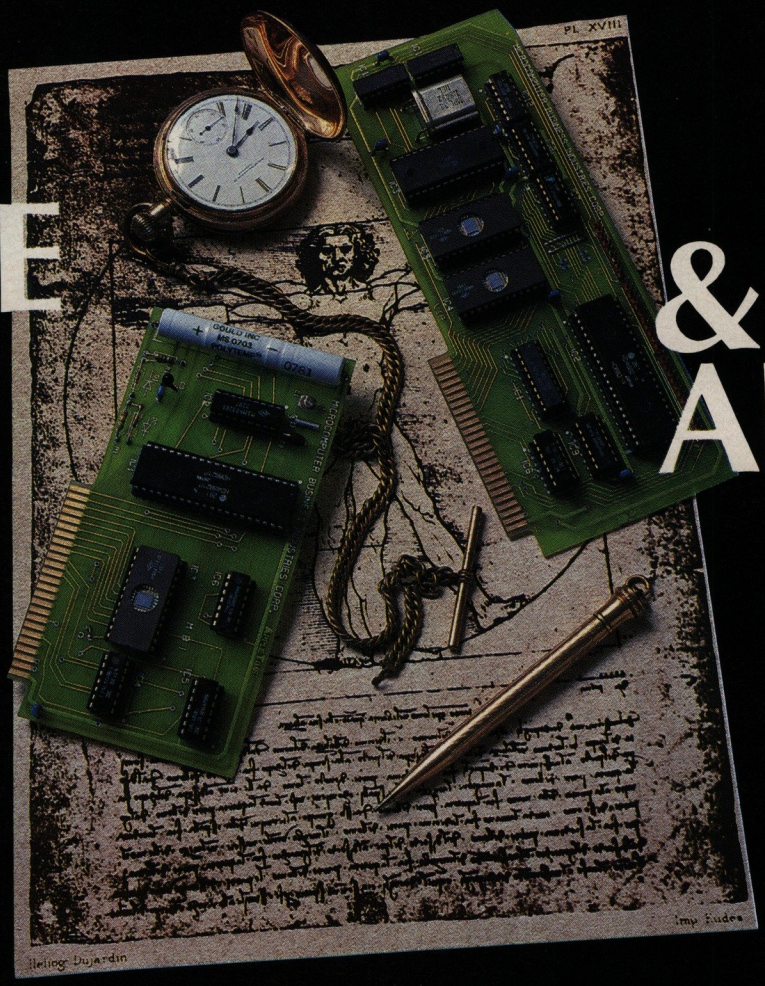

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DISASSEMBLY LINES

"PARSE"

by Sandy Mossberg
50 Talcott Rd.
Port Chester, NY 10573

In the last installment of DISASSEMBLY LINES, we began digging more deeply into the Applesoft ROM by dissecting CMDLP, INLIN and GDBUFS. This article will extend that excavation to include **PARSE**, a simple (ha!) subroutine. To avoid confusion, please note that this routine is named **RUN** by several sources — a nomenclature which I find misleading. As we shall see, calling PARSE will run the Applesoft program in memory under one special and unusual circumstance. The specific RUN vector which falls within PARSE, always causes the extant program to be executed and will be mentioned again as we proceed.

A QUICK "TOKEN" REVIEW

Before attacking PARSE, let us review line parsing, per se. **In Applesoft program lines, KEYWORDS appear in TOKENized form mainly for the purpose of conserving space**. In the most extreme example, **a TOKEN (one byte) may represent a 7 byte KEYWORD, e.g., HCOLOR=, NOTRACE, INVERSE, RESTORE**. Page 121 of the **APPLESOFT][BASIC PROGRAMMING REFERENCE MANUAL** lists all keywords and their respective tokens. To illustrate, consider the following line (typed at the keyboard and placed within the input buffer by INLIN):

10 FOR I = 1 TO 10

As we learned in the last article, this line is inserted by CMDLP into program space only after being tokenized by PARSE. Excluding the line number, the result in hex would be:

81 49 D0 31 C1 31 30

Three keywords, **FOR**, =, and **TO** are replaced by their corresponding tokens, **81**, **D0** and **C1**, with a saving of 3 bytes. Observe that tokens appear in negative ASCII (high bit set), whereas all other characters exist in positive ASCII (high bit clear) format. If this confuses you one bit, GOTO next paragraph. If it confuses you one byte, however, sit down at your trusty Apple, turn on the power and monitor, type **NEW** or **FP** to clear program space and enter one line of Applesoft code from the example above. Type **CALL-151** to get into the system monitor and type **801L**. Disregard the disassembled opcodes and operands —they are meaningless. Forget, too, locations $801-$804 (link and line number bytes). **The code from $805 to the first hex zero (EOL marker) represents the tokenized version of the line you typed**. Relate it to that line by using the above example and by referring to pages 121, 138 and 139 of the named manual. In this manner you will become fluent in parsing (tokenizing) Applesoft program lines.

PARSING

PARSE (LISTING 1) is 193 bytes of dynamite. **It will tokenize that portion of the input buffer (BUF) between TXTPTR and the EOL marker**. LINE 32 defines (X), which will index the original unparsed (old) BUF. The subsequent **DEX** (LINE 33) will be reversed by **INX** (LINE 48) when the heart of the parsing routine is entered. **(Y)** is set to 4 (LINE 34) and will index the parsed (new) BUF. When (Y) is incremented, the format **(BUF-5),Y** will point to the first character in **BUF** (LINES 106-108). Reviewing CMDLP will refresh your memory about the reason for using "BUF-5". The faculty of employing BUF both to interpret the original line and to store the new line is explained by the inability of a tokenized line to be longer than its untokenized equivalent; thus, **(BUF-5),Y** always references a location less than or equal to **BUF,X**. LINE 35 clears the DATA statement flag, which is evaluated by testing the **V-flag** (bit 6) of the processor status register ($48). In essence, these first 4 lines initialize the indexing registers and DATA flag in preparation for PARSE1.

RUN CONTROL

LINE 39 tests that funny **$D6** location which I call **RUNSW**. If positive (high bit clear), flow moves to PARSE1. If negative (high bit set), parsing is aborted by popping the return address from the stack (LINES 41-42) and causing the program in memory to run (LINES 43-44). As noted above, **$D566 (LINE 43) is the true entry point for the RUN command**. So now we see, first hand, one of the several RUNSW traps. Here, if RUNSW is set, parsing any input causes the current program to run. That's pretty sly!

LITERALS

PARSE1 (LINE 48) initially resets **(X)** to the entry location pointed to by **TXTPTR** and subsequently bumps the old **BUF** index. An unparsed BUF character is obtained (LINE 49). Unless the DATA flag is set, spaces will be ignored (LINES 50-53). The current character in **(A)** is stored in **ENDCHR** (LINE 54), which will serve as a literal flag if it holds a quotation mark ($22). If a quote appears (LINES 55-56), control passes to **PUTLIT** (LINE 128). If the DATA flag is set (LINE 57), **PUTBUF** (LINE 105) is entered. In a sense **DATA, REM and quotation statements are all "literal" in that they are accepted in an unparsed (literal) fashion**.

If no branch occurs, LINE 58 checks for a **question mark**, the symbol for **PRINT**. If found, the token for PRINT ($BA) is loaded into (A) (LINES 60-61) and is handled directly by PUTBUF; otherwise (LINE 59), the character under scrutiny is checked to determine if it might be the start of a keyword. If **0-9**, **colon** or **semi-colon** is found (LINES 62-64), that character cannot begin a keyword (check it out yourself) and thus may also be processed directly by PUTBUF (LINE 65).

THE KEYWORD TABLE

The Applesoft keyword table extends from **$D0D0-$D25E**. A hex zero at $D25F marks the end of the table. Keywords are stored in positive ASCII with the dextral character inverted, i.e. the last character in negative ASCII. Should a potential keyword be present, flow falls to **TBLPTR** (LINES 69-78) where the new BUF index (Y) is saved in **STRNG2**, the table pointer **(DSCTMP),Y** is set to **$D0CF**, the token indicator **TEMP** is zeroed and the old BUF index (X) is stored in

continued on next page

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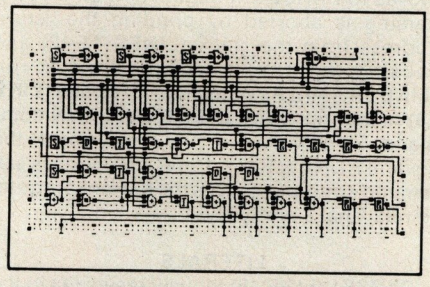

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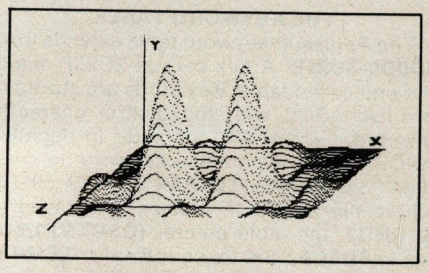

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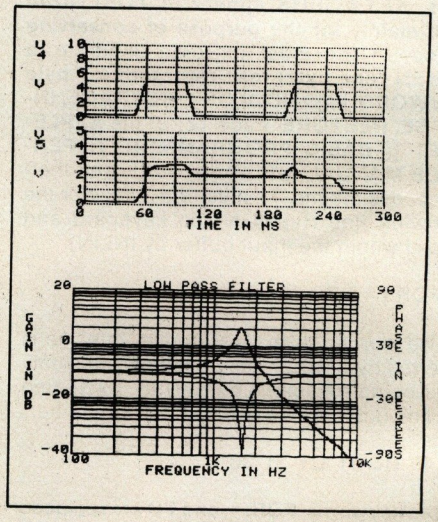

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"PARSE" (Cont.)

TXTPTR. In LINE 79, **(Y)** is incremented from **$FF** to **0**, causing **(DSCTMP),Y** to point at **$D0D0**, the beginning of the keyword table. **SETTKN** rejects spaces (LINES 82-85). By comparing old BUF characters (X-indexed) with characters from the keyword table (Y-indexed), a partial (positive ASCII) match is confirmed by a remainder of zero when the value of the table character is subtracted from that of the BUF character (LINES 86-88), in which case the next character is obtained by looping back to **KEYCHR** (LINE 79).

A final (negative ASCII) match, indicated by a remainder of $80 (LINES 89-90), establishes the existence of a complete keyword. No match (LINE 90) passes control to **NXKEY** (LINE 135), where the location of the next keyword is found. Assuming a complete match, tokenization is accomplished by adding **TEMP** to the **$80** already present in **(A)** (LINE 91). For instance, the tenth keyword in the table is TEXT. When a match occurs, ten cycles will have been made, TEMP will equal 9 (0 is the first cycle), and TEMP + $80 = $89, the token for TEXT. This is elegant code. The "ROM-writers" certainly were efficient.

ALL ABOUT "AT"

SETTKN next must deal with the **AT** keyword. Consider the following two lines:

100 DRAW X,Y AT N
200 DRAW X,Y AT O

Despite your intent, PARSE will not permit either line to exist as written. Let's see why. If AT ($C5) is the token (LINE 92), the next character in BUF is tested (LINE 94). Should **"N"** or **"O"** be found, **preference** is assigned to the keywords **ATN** and **TO** rather than AT (LINES 95-98). Thus, the above lines would list as:

100 DRAW X,Y ATN
200 DRAW X,Y A TO

Each line would evoke a syntax error. Such are the whims of Applesoft. One could circumvent this problem by not using the variables **"N"** or **"O"** after AT. Should neither of these letters follow **AT**, the token is reloaded into (A) (LINE 99) and flow falls into that portion of code which places non-literal, non-REM statement characters into BUF.

END OF THE LINE

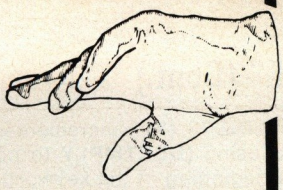
PUTTKN (LINE 104) restores the index to new **BUF**, and LINES 105-106 bump both indices. The character in (A), be it token or nontoken, is stored in new **BUF** (LINE 107). If that character is a hex zero (LINES 108-109), the parsing of BUF has been completed and **the end (FIN) is in sight**; otherwise, a test is made (LINES 110-111) for the **EOS marker (colon)**. If found (LINE 112), the DATA flag is cleared — if not, the DATA token is tested for (LINE 113) and if located, the DATA flag is set (storing $49 in **DATAFLG** sets bit 6). Finally, the **REM token** is tested for (LINE 117). If found, the literal flag **(ENDCHR)** is cleared (it may or may not have been set) and all subsequent line characters are transferred from old BUF to new BUF by **GETLIT** (LINES 124-127) and **PUTLIT** (LINES 128-131), the same code that handles insertion of literals and their delimiters (quotation marks). In the case of a **REM** statement, the loop is terminated at LINE 125. With a **literal**, the insertion loop is ended by finding the literal flag (LINES 126-127). If REM was not present, LINE 118 recycles flow to **GETINP** (LINE 49).

continued on page 59

LISTING 1

```
                  1   ***********
                  2   *         *
                  3   *  PARSE  *
                  4   *         *
                  5   ***********
                  6
                  7           ORG  $D559
                  8
                  9   * Locations
                 10
                 11   ENDCHR  =    $0E        ;Literal flag
                 12   TEMP    =    $0F        ;Token indicator
                 13   DATAFLG =    $13        ;DATA statement flag
                 14   DSCTMP  =    $9D        ;Pointer to keyword table
                 15   STRNG2  =    $AD        ;Stores (Y)
                 16   TXTPTR  =    $B8        ;Text pointer
                 17   RUNSW   =    $D6        ;RUN switch
                 18   BUF     =    $200       ;Start of input buffer
                 19   TKNTBL  =    $D0D0      ;Start of keyword table
                 20   CLEAR   =    $D665      ;Clear stack, vars & init TXTPTR
                 21   NEWSTT  =    $D7D2      ;Execute new statement
                 22
                 23   * Tokens
                 24
                 25   DATA    =    $83
                 26   REM     =    $B2
                 27   PRINT   =    $BA
                 28   AT      =    $C5
                 29
                 30   ** Set (X),(Y) and clear DATA flag for PARSE subroutine
                 31
D559: A6 B8      32   PARSE   LDX  TXTPTR     ;Index to old (unparsed) BUF
D55B: CA         33           DEX
D55C: A0 04      34           LDY  #4         ;Index to new BUF (BUF-5)
D55E: 84 13      35           STY  DATAFLG    ;Clear DATA statement flag
                 36
                 37   ** Check that tricky $D6 "RUN-switch"
                 38
D560: 24 D6      39           BIT  RUNSW      ;Is hi bit set on $D6 switch?
D562: 10 08      40           BPL  PARSE1     ;No. Parse BUF
D564: 68         41           PLA             ;Yes. Ignore PARSE routine
D565: 68         42           PLA             ;  and RUN program
D566: 20 65 D6   43   RUN     JSR  CLEAR
D569: 4C D2 D7   44           JMP  NEWSTT
                 45
                 46   ** Evaluate character in original (unparsed) input buffer
                 47
D56C: E8         48   PARSE1  INX             ;Bump old BUF index
D56D: BD 00 02   49   GETINP  LDA  BUF,X      ;Get old BUF char
D570: 24 13      50           BIT  DATAFLG    ;DATA flag set (bit 6 on)?
D572: 70 04      51           BVS  INSPC      ;Yes. Process space if present
D574: C9 20      52           CMP  #' '       ;No. If space,
D576: F0 F4      53           BEQ  PARSE1     ;  ignore it
D578: 85 0E      54   INSPC   STA  ENDCHR     ;Literal flag if (A) is quote
D57A: C9 22      55           CMP  #'"'       ;Quotation mark?
D57C: F0 74      56           BEQ  PUTLIT     ;Yes. Enter literal
D57E: 70 4D      57           BVS  PUTBUF     ;No. Enter data if flag set
D580: C9 3F      58           CMP  #'?'       ;PRINT symbol (?)?
D582: D0 04      59           BNE  CKKEY      ;No. Check possible keyword
D584: A9 BA      60           LDA  #PRINT     ;Yes. Substitute PRINT token
D586: D0 45      61           BNE  PUTBUF     ;Always
D588: C9 30      62   CKKEY   CMP  #'0'       ;1st char of keyword
D58A: 90 04      63           BCC  TBLPTR     ;  cannot be 0-;
D58C: C9 3C      64           CMP  #'<'
D58E: 90 3D      65           BCC  PUTBUF
                 66
                 67   ** Replace KEYWORD with TOKEN
                 68
D590: 84 AD      69   TBLPTR  STY  STRNG2     ;Save index to new BUF
D592: A9 D0      70           LDA  #<TKNTBL   ;Set keyword table
D594: 85 9D      71           STA  DSCTMP     ;  pointer at $CFD0
D596: A9 CF      72           LDA  #>TKNTBL-$100
D598: 85 9E      73           STA  DSCTMP+1
D59A: A0 00      74           LDY  #0         ;(Y) now indexes keyword table
D59C: 84 0F      75           STY  TEMP       ;TEMP+$80=token
D59E: 88         76           DEY             ;(DSCTMP),Y=$D0CF
D59F: 86 B8      77           STX  TXTPTR     ;Save old BUF index
D5A1: CA         78           DEX
D5A2: C8         79   KEYCHR  INY             ;(DSCTMP),Y=$D0D0 on 1st pass
D5A3: D0 02      80           BNE  BUFCHR
D5A5: E6 9E      81           INC  DSCTMP+1   ;Bump pointer hi if (Y)=0
D5A7: E8         82   BUFCHR  INX             ;Bump old BUF index
D5A8: BD 00 02   83   SETTKN  LDA  BUF,X      ;Get old BUF char
D5AB: C9 20      84           CMP  #' '       ;Space?
```

continued on page 59



VOLUME TWO!

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by Bob Nacon

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** Print string arrays to any device, with or without an appended special character, and WITHOUT A LOOP...

** Set, clear, or toggle ANY bit or bits anywhere in RAM memory...

** Check the keyboard when called, pause if SPACEBAR is pressed, then continue if SPACE is pressed again or GOTO a location if RETURN is pressed...

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Talk is cheap

"PARSE" (Cont.)

Using the opcode **SBC** instead of **CMP** is a noteworthy technique. If the test succeeds, a predetermined value remains in (A) and may be transferred to a desired location (LINES 89-91, 110-115 and 116-119). Under the proper circumstances, the method is efficient.

NXKEY AND FIN

Two more short segments must be unraveled. **NXKEY** (LINES 135-146) skips keywords and increments the token indicator **(TEMP)** if a keyword match is not completed. The routine merely obtains succeeding characters in the keyword table (LINES 137-140) and checks for a negative ASCII character (end of keyword) by shifting all bits left (LINE 141) and testing the **C-flag**. On carry set (LINE 143) the first character of the next keyword is loaded into (A) and SETTKN is reentered (LINE 144). Encountering a hex zero (LINE 145) means that the entire keyword table has been searched unsuccessfully, in which case the old BUF character cannot be the start of a keyword and will be placed into new BUF by a forced branch to **PUTTKN** (LINE 146).

FIN (LINES 150-154) **terminates PARSE** by placing a hex zero in BUF two bytes beyond the EOL marker and returns with **TXTPTR** set at **BUF-1**. The former instruction is unclear to me. The relative position of the zero byte could make it an EOP marker; however, CMDLP does not appear to transfer it to program memory. Help!

Well, there it is — the one and only Applesoft line parsing subroutine. Stop complaining. Nobody promised you a rose garden. The code and explanation may be complex, but PARSE is M.L. at its best.

THE SEEBUF PROGRAM

Your bonus this issue is a short relocatable program, **SEEBUF**, which will **enable you to visualize the input buffer before and after parsing. It graphically illustrates the results of tokenization. Control characters will flash and tokens will be inverse.** By experimenting with various line constructions, the peculiarities of PARSE will become clear. Do not expect tokenization of DOS commands, since they are intercepted within the INLIN subroutine.

To utilize SEEBUF, enter the "binary" code manually (NIBBLE's M.L.E. program is a superb tool for this purpose) or assemble it. For instructions on entering machine code directly into memory see the Letters section of this issue. Although I chose **$300-$386** to place the program, it is relocatable and may be tucked into any safe place. If you do enter code manually and prefer to use another spot, remember to set Mr. Ampersand to call the start of **SEEBUF** properly (LINE 50). **BSAVE SEEBUF, A$300, L$87** to save the program to disk. BRUNning SEEBUF will load it and fix the ampersand vector.

SEEBUF EXAMPLE

Let's experiment. Clear program memory with the **NEW** or **FP** command. Type **&-RETURN** and note that the **SEEBUF colon prompt** has replaced the usual right bracket of Applesoft. Enter this line:

: 10 D$ = "" : REM CTL-D

Make sure to type a control D between the two quotes. Once RETURN has been pressed, the following tokenized printout will appear below:

	10	D	$	D0	"	D	"	:	B2	C	T	L	-	D	00
meaning				=		CTL-D			REM						EOB
mode				I		F			I						I

continued on page 61

```
D5AD: F0 F8      85            BEQ  BUFCHR        ;Yes. Ignore it
D5AF: 38         86            SEC                ;No
D5B0: F1 9D      87            SBC  (DSCTMP),Y    ;Does it match keyword char?
D5B2: F0 EE      88            BEQ  KEYCHR        ;Yes (non-final char match)
D5B4: C9 80      89            CMP  #$80          ;Complete match?
D5B6: D0 41      90            BNE  NXKEY         ;No. Get next keyword
D5B8: 05 0F      91            ORA  TEMP          ;Yes. Set token ($80+TEMP)
D5BA: C9 C5      92            CMP  #AT           ;AT token?
D5BC: D0 0D      93            BNE  PUTTKN        ;No
D5BE: BD 01 02   94            LDA  BUF+1,X       ;Yes. Check preference
D5C1: C9 4E      95            CMP  #'N'
D5C3: F0 34      96            BEQ  NXKEY         ;ATN preference
D5C5: C9 4F      97            CMP  #'O'
D5C7: F0 30      98            BEQ  NXKEY         ;TO preference
D5C9: A9 C5      99            LDA  #AT           ;Neither. Reload AT
                 100
                 101  ** Store character in new location in input buffer
                 102  ** and check for DATA and REM statements
                 103
D5CB: A4 AD      104  PUTTKN   LDY  STRNG2        ;Restore new BUF index
D5CD: E8         105  PUTBUF   INX                ;Bump old BUF index
D5CE: C8         106           INY                ;Bump new BUF index
D5CF: 99 FB 01   107           STA  BUF-5,Y       ;Save in BUF (new)
D5D2: B9 FB 01   108           LDA  BUF-5,Y       ;Condition Z-flag
D5D5: F0 39      109           BEQ  FIN           ;Done
D5D7: 38         110           SEC
D5D8: E9 3A      111           SBC  #':'          ;If EOS,
D5DA: F0 04      112           BEQ  DFLG          ;  clear DATA flag
D5DC: C9 49      113           CMP  #DATA-':'     ;If DATA statement, set flag
D5DE: D0 02      114           BNE  CKREM         ;If not, don't change flag
D5E0: 85 13      115  DFLG     STA  DATAFLG
D5E2: 38         116  CKREM    SEC
D5E3: E9 78      117           SBC  #REM-':'      ;REM statement?
D5E5: D0 86      118           BNE  GETINP        ;No. Back for more
D5E7: 85 0E      119           STA  ENDCHR        ;Yes. Clear literal flag
                 120
                 121  ** Transfer literal or REM statement from original
                 122  ** to new location in input buffer
                 123
D5E9: BD 00 02   124  GETLIT   LDA  BUF,X         ;Get old BUF char
D5EC: F0 DF      125           BEQ  PUTBUF        ;EOL
D5EE: C5 0E      126           CMP  ENDCHR
D5F0: F0 DB      127           BEQ  PUTBUF        ;End of literal
D5F2: C8         128  PUTLIT   INY                ;Bump new BUF index
D5F3: 99 FB 01   129           STA  BUF-5,Y       ;Store in new BUF location
D5F6: E8         130           INX                ;Bump old BUF index
D5F7: D0 F0      131           BNE  GETLIT        ;Always
                 132
                 133  ** Skip keyword
                 134
D5F9: A6 B8      135  NXKEY    LDX  TXTPTR        ;Restore old BUF index
D5FB: E6 0F      136           INC  TEMP          ;Bump token indicator
D5FD: B1 9D      137  NKY1     LDA  (DSCTMP),Y    ;Get keyword char
D5FF: C8         138           INY                ;Bump table index
D600: D0 02      139           BNE  NKY2
D602: E6 9E      140           INC  DSCTMP+1      ;Bump pointer hi if (Y)=0
D604: 0A         141  NKY2     ASL
D605: 90 F6      142           BCC  NKY1          ;If pos ASCII, get another char
D607: B1 9D      143           LDA  (DSCTMP),Y    ;1st char next keyword
D609: D0 9D      144           BNE  SETTKN        ;Not end of table. Loop back
D60B: BD 00 02   145           LDA  BUF,X         ;End of table. Current BUF char
D60E: 10 BB      146           BPL  PUTTKN        ;  is non-keyword. Branch always
                 147
                 148  ** End it all
                 149
D610: 99 FD 01   150  FIN      STA  BUF-3,Y       ;Put hex zero 2 bytes beyond EOL
D613: C6 B9      151           DEC  TXTPTR+1      ;Return with TXTPTR at BUF-1
D615: A9 FF      152           LDA  #<BUF-1
D617: 85 B8      153           STA  TXTPTR
D619: 60         154           RTS
```

continued on next page

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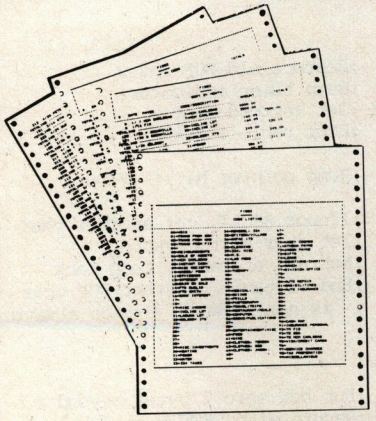

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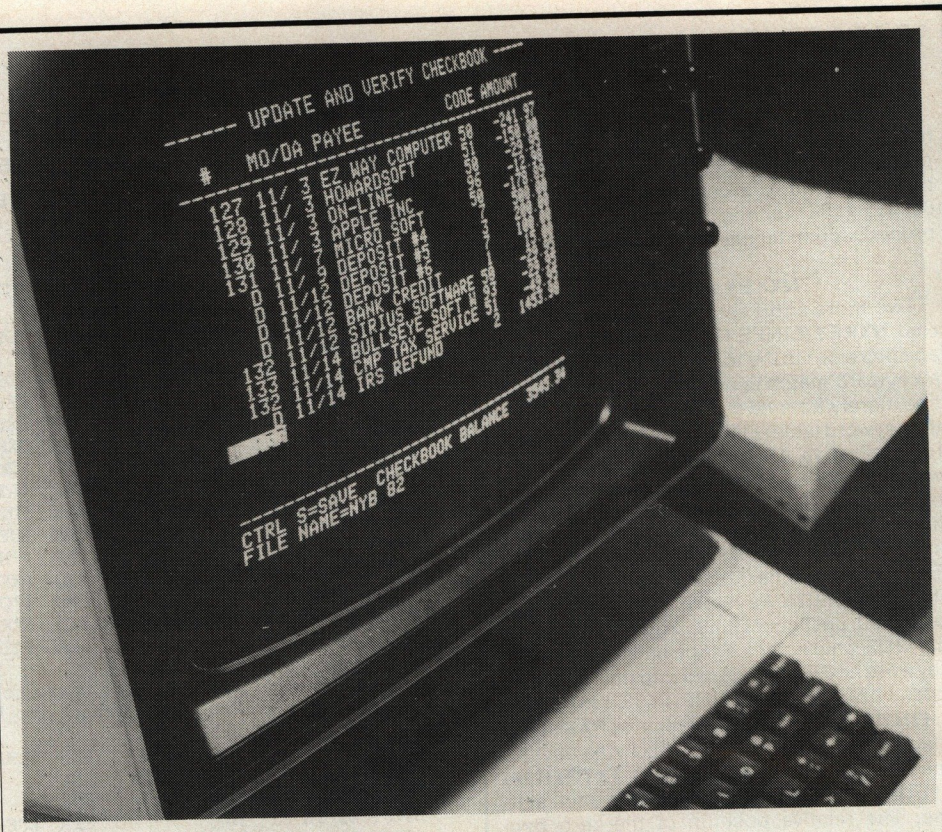

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"A fun program?" we said. "It's already fun. Even people who hate checkbook balancing say it's fun".

"I want it even more fun".

"How?", we said. "It's got a hundred user-defined categories. Why..."

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"PARSE" (Cont.)

The lower two lines are not seen on the screen. The first explains what each token or control character represents, and the second denotes the mode (inverse, flashing) in which the output is presented. The terminal hex zero is the **EOB** mark. To confirm that the line has been parsed in the manner which you expected, type **LIST** and check it out. In this example we find no discrepancy between the SEEBUF entry and the listed line.

Let us go around once again. Type **&-RETURN** and enter the line:

: 20 IF NOT A THEN 5

Here, the tokenized input may surprise you:

	20	AD	C6	C5	H	E	N	5	00
meaning		IF	NOT	AT					EOB
mode		I	I	I					I

Finally, PARSE has stopped treating **AT** like a second-class citizen. Why this change of heart? It is merely a matter of which keyword comes first. Since AT precedes THEN in the typed line, AT is given preference. List LINE 20 and confirm your suspicion:

20 IF NOT AT HEN5

You should have fun exploring the numerous possibilities.

HOW IT WORKS

The A.L. program **(LISTING 2)** is uncomplicated. LINES 40-46 allow Mr. Ampersand to call SEEBUF. In essence, LINES 50-70 duplicate the initial portion of CMDLP (see prior issue of NIBBLE) with the exception of LINE 52 which substitutes the colon for the normal Applesoft prompt, and LINES 50-51 and 57-58 which format screen output.

If a direct command is entered, **CHRGET** (LINE 59) picks up a non-digit as the first character in **BUF** and sets the carry bit. **SEEBUF** employs two indigenous flags — both are considered set when positive and clear when negative (the reverse of most Applesoft flags, e.g. LINE 56). **LNFLG** is cleared in LINE 64 — it will differentiate a program line from a direct command. **ENDFLG** is cleared in LINE 84 — when set it will signal the end of the **PRBUF** routine. If a direct command has been issued, LINE 65 routes flow to **PRBUF** which prints the tokenized line below the input line (LINES 81-96).

On reaching the **EOL** marker, LINE 87 branches to **PREND** (LINE 97) where **ENDFLG** is set, the hex zero is printed inversely (LINES 98-100), **ENDFLG** is tested (LINE 101) and, if set, control falls to LINE 106 which tests **LNFLG** and, on finding it clear, executes the direct command (LINE 109). Returning to LINE 65, on carry clear (program line entered), pointers are reset (LINES 66-69), and **LINGET** (LINE 70) places a "legal" line number into **LINNUM** (unlike last issue's **BIGNUM**, which accepted "illegal" line numbers 64000-65535). After setting **LNFLG** (LINE 74), the tokenized line is printed by LINES 75-96. In this situation, when **LNFLG** is set, (LINES 107-108), **CMDLP** is reentered at **$D46C** and the line is placed into program memory where you may examine it by using the **LIST** command.

PRBUF should cause little confusion. A token (negative ASCII) is printed inversely by **PRTKN** (LINES 98-100), whereas a nontoken is checked to see if it is a control character (LINE 89). If so, adding $40 (LINE 91) converts it to flashing and **COUT** (LINE 94) prints it. A non-control character is changed to negative ASCII (LINE 93) and output (LINE 94). Take note that **OUTDO** ($DB5C), the Applesoft output subroutine, cannot be employed because it does not take kindly to control characters, as evidenced by listing a line which contains an imbedded control character.

Enjoy it all.

LISTING 2

```
1    ************
2    *          *
3    *  SEEBUF  *
4    *          *
5    ************
6
7              ORG  $300
8              OBJ  $300
9
10   ENDFLG   =   $06      ;END flag
11   LNFLG    =   $07      ;LINE flag
12   TEMP     =   $0F      ;Temp storage
13   CH       =   $24      ;Horizontal cursor position
14   LINNUM   =   $50      ;Line number
15   VARTAB   =   $69      ;LOMEM=start of SVAR space
16   CURLIN   =   $75      ;Current line #
17   PRGEND   =   $AF      ;End of program
18   CHRGET   =   $B1      ;Bump text pointer and get char
19   TXTPTR   =   $B8      ;Text pointer
20   ERRFLG   =   $D8      ;ONERR flag
21   BUF      =   $200
22   AMPER    =   $3F5     ;Ampersand vector
23   CMDLPEV  =   $D46C    ;Entry to command loop
24   INLIN    =   $D52C    ;Get input (Applesoft style)
25   PARSE    =   $D559
26   EXECUTE  =   $D805    ;Execute program statement
27   LINGET   =   $DA0C    ;Integer at TXTPTR to LINNUM
28   CRDO     =   $DAFB    ;Carriage return
29   BASICWRM =   $E003    ;Warm entry to BASIC
```

continued on next page

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"PARSE" (Cont.)

```
                        LINPRT   =    $ED24      ;Print decimal of (A),(X)
                        UP       =    $FC1A      ;Move cursor up one row
                        CLREOL   =    $FC9C      ;Clear to end of line
                        PRBYTE   =    $FDDA      ;Output hex byte
                        COUT     =    $FDED      ;Output char
                        SETINV   =    $FE80      ;Set inverse mode
                        SETNORM  =    $FE84      ;Set normal mode

                        ** Set ampersand vector to call SEEBUF

0300: A9 4C                     LDA  #$4C
0302: 8D F5 03                  STA  AMPER
0305: A9 10                     LDA  #<SEEBUF
0307: 8D F6 03                  STA  AMPER+1
030A: A9 03                     LDA  #>SEEBUF
030C: 8D F7 03                  STA  AMPER+2
030F: 60                        RTS

                        ** Use setup similar to CMDLP

0310: 20 1A FC          SEEBUF  JSR  UP          ;Format so that "]&" will
0313: 20 9C FC                  JSR  CLREOL      ;  be replaced by ":"
0316: A2 BA                     LDX  #":"        ;Set SEEBUF prompt char
0318: 20 2E D5                  JSR  INLIN+2     ;Get input
031B: 86 B8                     STX  TXTPTR      ;Text pointer at BUF-1
031D: 84 B9                     STY  TXTPTR+1
031F: 46 D8                     LSR  ERRFLG      ;Clear (pos) ONERR flag
0321: 20 FB DA                  JSR  CRDO
0324: E6 24                     INC  CH
0326: 20 B1 00                  JSR  CHRGET      ;Evaluate 1st char in BUF
0329: AA                        TAX              ;Allow leading colon
032A: F0 58                     BEQ  NOINP       ;No input. Exit SEEBUF
032C: A2 FF                     LDX  #$FF        ;Set immediate mode
032E: 86 76                     STX  CURLIN+1
0330: 86 07                     STX  LNFLG       ;Clear (neg) LINE flag
0332: B0 14                     BCS  PRBUF       ;Direct command given
0334: A6 AF                     LDX  PRGEND      ;Set LOMEM=end of program
0336: 86 69                     STX  VARTAB
0338: A6 B0                     LDX  PRGEND+1
033A: 86 6A                     STX  VARTAB+1
033C: 20 0C DA                  JSR  LINGET      ;Put line # in LINNUM

                        ** Print line number

033F: 46 07                     LSR  LNFLG       ;Set (pos) LINE flag
0341: A6 50                     LDX  LINNUM
0343: A5 51                     LDA  LINNUM+1
0345: 20 24 ED                  JSR  LINPRT      ;Print decimal line #

                        ** Print tokenized input buffer

0348: 20 59 D5          PRBUF   JSR  PARSE       ;Tokenize input (sans line #)
034B: 84 0F                     STY  TEMP        ;BUF index (#char+5)
034D: AA                        TAX              ;PARSE exits with (A)=$FF
034E: 86 06                     STX  ENDFLG      ;Clear (neg) END flag
0350: E8                NXCHR   INX              ;Bump BUF index
0351: BD 00 02                  LDA  BUF,X       ;Get BUF char
0354: F0 12                     BEQ  PREND       ;EOL marker
0356: 30 12                     BMI  PRTKN       ;Token
0358: C9 20                     CMP  #' '        ;Control char?
035A: B0 04                     BCS  SETHI       ;No
035C: 09 40                     ORA  #$40        ;Yes. Convert to flashing
035E: D0 02                     BNE  PRCHR       ;Always
0360: 09 80             SETHI   ORA  #$80        ;Convert to normal
0362: 20 ED FD          PRCHR   JSR  COUT        ;Print non-token
0365: 18                        CLC
0366: 90 E8                     BCC  NXCHR       ;Always
0368: 85 06             PREND   STA  ENDFLG      ;Set (pos) END flag
036A: 20 80 FE          PRTKN   JSR  SETINV
036D: 20 DA FD                  JSR  PRBYTE      ;Print inverse token
0370: 20 84 FE                  JSR  SETNORM
0373: 24 06                     BIT  ENDFLG      ;Done?
0375: 30 D9                     BMI  NXCHR       ;No. Get another char

                        ** Process line or execute direct command

0377: 20 FB DA                  JSR  CRDO        ;Yes
037A: 24 07                     BIT  LNFLG       ;Program line?
037C: 10 03                     BPL  PROCLN      ;Yes. Process it
037E: 4C 05 D8                  JMP  EXECUTE     ;No. Execute direct command
0381: 4C 6C D4          PROCLN  JMP  CMDLPEV     ;Reenter CMDLP to process line

                        ** No input

0384: 4C 03 E0          NOINP   JMP  BASICWRM    ;Back to Applesoft
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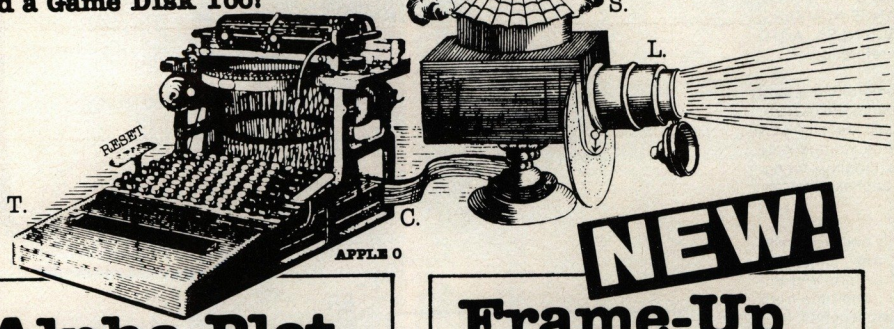
NEW APPLE® UTILITIES FROM BEAGLE BROS

And a Game Disk Too!



NEW!

Alpha Plot

Hi-Res Graphics/Text Utility
by Bert Kersey & Jack Cassidy

Here are a few of Alpha Plot's useful graphics features. Compare with other graphic utilities at any price—

HI-RES DRAWING: Create hi-res pictures and charts with text, on both pages; all Optional Xdraw cursor (see lines before drawing). Mix colors & Reverse (background opposite). Circles, Boxes, Ellipses; filled or outlined. **Compress Hi-Res to 1/3 disk space.** Relocate any portion of an image anywhere on either page. Superimpose too & convert hi-res to lo-res for colorful abstracts!

HI-RES TEXT: Beautiful upper/lower case with descenders (no hardware required). Color and reverse characters positionable anywhere (no vtab/htab limitations). Professional-looking **proportional spacing** and adjustable character height and letter spacing. Sideways typing for graphs too!

$39.50
- ☐ Unprotected disk (48K min.)
- ☐ Beagle Bros Apple Tip Book #4
- ☐ Peeks & Pokes Chart

Frame-Up

Graphics Display Utility
by Tom Weishaar

Frame-Up is a very-high-speed Apple "slide projector" utility that lets you create professional-looking displays of intermixed hi-res, lo-res and text pages **on any Apple.** Frame-Up is very easy-to-use and above-all **FAST,** allowing you to load hi-res pictures, for example, in **2½-seconds;** that's five-times faster than normal! Paddles or keyboard are used to change images in forward or reverse order, skipping pages if you want. OR presentations may be left unattended, with **each page individually timed** to appear and remain on the screen from 3 to 99 seconds, as you choose.

Frame-Up includes a sophisticated black and white **text screen editor** that lets you create text "slides" as part of your show. You can even add type "live" on the screen during your presentations. Up to 17 hi-res or 136 lo-res/text pages may be stored per disk. One or two drives are supported. The order and timing of your graphics and text images may be easily (and instantly!) arranged and rearranged. Frame-Up includes a **display module which may be copied** and distributed to your associates so they can run your display, as you designed it, on their Apple or ANY Apple!

Frame-Up is ideal for store displays, presentations to the boss, club programs, trade show booths, product demos, promotions, seminars, conventions, classes, and so on.

$29.50 Machine language. Unprotected. 48K minimum. Peek/Poke Chart included.

Apple® Mechanic

Shape Writer/Byte-Zap Utility
by Bert Kersey

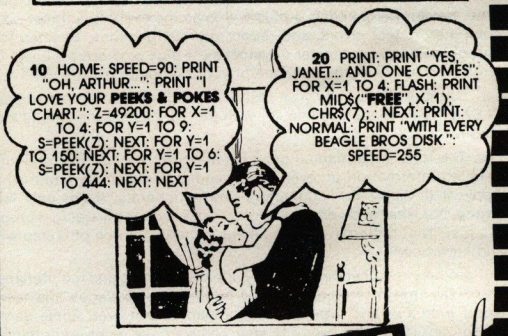
Another best-selling multiple-utility disk—Nine useful, listable, copyable and customizable programs—

SHAPE EDITOR: Put professional hi-res animation in your programs. Keyboard-draw any shape and let your Apple write a shape table and store it on disk. Design large and small **custom typefaces** too, with special characters. 6 fonts on the disk. LISTable demos show how to use shape tables to animate games, graphic displays, and attractive Charts & Graphs. A valuable time-saving utility/learning tool.

BYTE ZAP: A MUST utility. Rewrite any byte on a disk by loading a sector onto the screen for inspection. **Hex/Dec/Ascii** display optional. Examine bytes via cursor control; enter hex, dec or ascii to change. Create illegal filenames, restore deleted files, change greeting program names, repair/protect disks, change DOS, examine program files. Clear illustrated instructions show how disk data is stored and how to access it. Very educational.

MORE: A disk PACKED with useful music, text and hi-res tricks **for use in your programs.** A great demo-writer program, useful hi-res utilities and educational, entertaining documentation.

$29.50
- ☐ Unprotected disk (48K min.)
- ☐ Beagle Bros Tip Book #5
- ☐ Peeks & Pokes Chart



NEW!

Beagle Bag!

12 Games on One Big Disk
by Bert Kersey

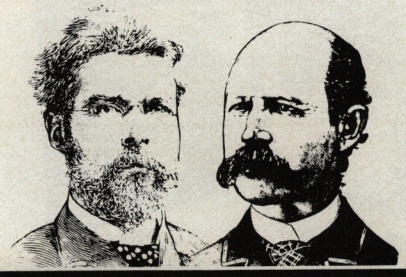
Twelve great games from our classic Beagle Bros collection—TextTrain, Slippery Digits, Wowzo, Magic Pack, Buzzword... Almost all of our "Game Pack" games have been updated and re-released on one jam-packed unprotected disk! **ALSO INCLUDED** is our "Beagle Menu" greeting program (description under "Typefaces" disk on this page).

Compare Beagle Bag with any 1-game locked-up disk on the market today!

All 12 games are a blast, the price is right, the instructions are crystal clear, AND the disk is copyable! You can even list the programs to see what makes them tick!

$29.50 Unprotected. Paddles NOT required. Beagle Menu works with all normal-DOS disks. Includes Peeks/Pokes Chart.

BEAGLE BROS DISKS ARE UNLOCKED AND UNPROTECTED. THIS MEANS EVERY PROGRAM IS INSPECTABLE, CUSTOMIZABLE, IF YOU WANT, AND COPYABLE, GIVING YOU THE MOST FOR YOUR SOFTWARE DOLLARS. DON'T SETTLE FOR LESS.



Beagle Bros™ MICRO SOFTWARE

4315 Sierra Vista, San Diego, Ca 92103
714-296-6400

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NEW!

Typefaces

for Apple Mechanic

Here are more hi-res fonts for Apple Mechanic's Xtyper and Hi-Writer programs—26 of them at last count, both large and small, all **proportionally-spaced** and positionable anywhere on either hi-res screen. Most are **full 96-character fonts** many with special graphic characters. Each character (from "!" to "□") of every font (from "Ace" to "Zooloo") is, of course, editable with Apple Mechanic's Font Editor.

BONUS: Here's BEAGLE-MENU! A unique greeting program that displays **only the catalog file names you want** on the screen (for example, only locked-Applesoft files, or only Binary files) for one-key cursor selection. Just hit Return to Run, Brun or Exec the program at the cursor. Many other features— Space-on-Disk, Load/Bload option, forward and backward catalog "scrolling" for easy file location, and optional sector-number elimination. PLUS the ability to **swap file names** in your catalog!

$20.00 Unprotected. Beagle Bros' Apple Mechanic disk is required to utilize the type fonts. Beagle Menu works with all normal-DOS 3.3 disks.

If you don't find our products at your Apple Dealer, tell him to phone Beagle Bros 714-296-6400 **OR** his favorite software distributor

If you don't find our products at your Apple Dealer, tell him to phone Beagle Bros. 714-296-6400, **OR** his favorite software distributor.

NEW!

Flex Text

70-Column Text Utility
by Mark Simonsen

Flex Text is a unique utility that lets you print variable-width text on Apple's hi-res screens in normal 40-column format, 20-column expanded or 56- and **70-column condensed** characters. Character widths may be mixed as you like for emphasis. Flex Text understands **normal Applesoft** Basic commands, including Home, Inverse, Normal, Vtab 1-24 and **Htab 1 through 70**! It also supports text window pokes and scrolling, so you can program normally, but with the **ability to add text to graphics**, or graphics to text! You can even run your existing programs using these features!

Flex Text is easy to use; just boot it and go! You can now display **upper and lower case** characters in any width without hardware. Every keyboard character may be redefined as any symbol you like with a custom text **character editor.** You may toggle between the "normal" text screen and both hi-res pages if you like. Flex Text is **completely compatible** with Neil Konzen's Program Line Editor and G.P.L.E.

$29.50 Machine language. Unprotected. 48K min. Peek/Poke chart included. Condensed character display requires a monitor (instead of a tv) for best results.

```
10 REM HI-RES NUMBER GENERATOR
20 SIZE=5: SCALE=SIZE: REM NUMBER-HEIGHT
30 HGR: HOME: POKE 232, 0: POKE 233, 3: ROT=0
40 FOR A=768 TO 830: READ B: POKE A, B: NEXT A
50 N=N+1: N$=STR$(N): X=99: Y=0
60 FOR A=1 TO LEN(N$): HCOLOR=0: DRAW 8 AT
   X, Y: HCOLOR=3: DRAW VAL(MID$(N$, A, 1))
   AT X, Y: X=X+SIZE+SIZE: NEXT A: GOTO 50
70 DATA 20, 0, 24, 0, 27, 0, 31, 0, 35, 0, 39, 0, 44, 0,
   49, 0, 52, 0, 57, 0, 53, 62, 36, 0, 49, 38, 0, 53,
   55, 61, 0, 53, 23, 37, 0
80 DATA 46, 38, 52, 0, 61, 46, 62, 5, 0, 61, 54, 37, 7,
   0, 53, 38, 0, 54, 37, 60, 46, 0, 53, 39, 53, 62, 5, 0
```

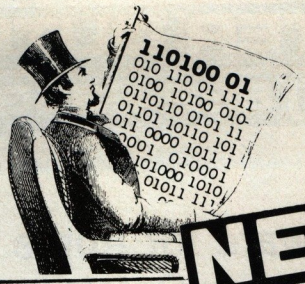
DOS Boss

Disk Command Editor
by Bert Kersey & Jack Cassidy

A classic Apple utility you will ENJOY! Rename DOS commands ("Catalog" can be "Cat", etc.). PROTECT PROGRAMS; any unauthorized save- attempt produces a "Not Copyable" message. Also **List-prevention** and 1-key program-run from catalog. Custom catalogs: Change Disk Volume message to your title; Omit or alter file codes. Rewrite error messages: "Syntax Error" can be renamed "Oops!!" or anything you want! **Two books included**— Fascinating documentation and hours of good Apple reading!

Dos Boss's change features may be appended to your programs so that anyone using your disks (booted or not) formats DOS as YOU designed it.

$24.00
- ☐ Unprotected disk (32K/48K)
- ☐ The Dos Boss Book
- ☐ Beagle Bros Apple Tip Book #2
- ☐ Peeks & Pokes Chart



NEW!

Before you buy any Apple game disk, compare features:

Is there more than one game? Beagle Bag features TWELVE unique games on one disk PLUS a bonus greeting-program utility for use on all of your existing 3.3 disks.

Can it teach programming skills? Beagle Bag games are listable so you can see what makes them work. You can even CHANGE each game's features if you want.

Is the disk copyable? Beagle Bag can be backed-up with ANY copy program. Don't buy software that can't be backed up!

Is the disk unlocked? The Beagle Bag disk can be catalogged, loaded-from, saved-to and Fidded, making it more flexible and more FUN than any locked-up One-Game disk on the market today.

Is the disk priced right? Counting the bonuses, Beagle Bag costs less than $2 per program. This is a disk that will "earn its keep" as long as you own your Apple!

BEAGLE BAG $29.50
(See description on previous page.)

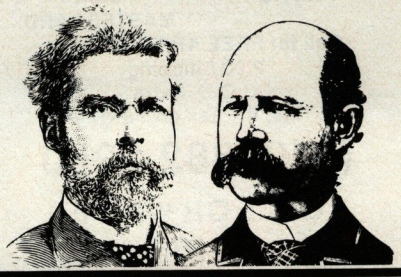
Tip Disk#1

100 Tip Book Tips on Disk
by Bert Kersey

100 programs from Beagle Bros' Tip Books 1, 2, 3 and 4— Fascinating tricks to make your Apple do things it's never done before! All 100 programs are listable, copyable and changeable; and each teaches another fascinating Apple programming technique. **Two different charts are included.**

$20.00
- ☐ Unprotected (32K/48K)
- ☐ Peeks & Pokes Chart
- ☐ Apple II Command Chart

BEAGLE BROS DISKS ARE UNLOCKED AND UNPROTECTED. THIS MEANS EVERY PROGRAM IS INSPECTABLE, CUSTOMIZABLE, IF YOU WANT, AND COPYABLE, GIVING YOU THE MOST FOR YOUR SOFTWARE DOLLARS. DON'T SETTLE FOR LESS.



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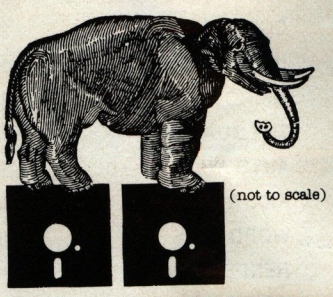
Utility City

21 Utilities on One Disk
by Bert Kersey

A best-seller since it hit the market, and a MUST for your program-development library. Take a look at the features— **List Formatter** makes properly-spaced & indented listings with page breaks; each statement on new line, if-thens and loops called out; a great de-bugger! **Multi-Column Catalog** in any page-width to any printer or CRT. Auto-post Run-Number and last-used Date in programs. Put INVISIBLE working commands in your listings. Access program lines in memory for repair & illegal alteration. Alphabetize & store info on disk. Run any program while another stays intact. Renumber to 65535. Save inverse, trick and **invisible file names**. Convert dec to hex & binary, or Integer to FP. Append programs. Dump text screen to printer...

21 LISTABLE UTILITIES TOTAL!

$29.50
- ☐ Unprotected disk (48K min.)
- ☐ Beagle Bros Apple Tip Book #3
- ☐ Peeks & Pokes Chart



(not to scale)

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Most dealers carry our software. If yours doesn't, he can have our disks in his store for you **within 2-3 days** by calling us or his favorite software distributor.

Or Order by Phone:

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Visa/MasterCard/COD* orders, call
Nationwide: **1-800-854-2003** ext.827
California: **1-800-522-1500** ext.827
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(ORDERS ONLY, PLEASE) *COD, add $3.00.

OR ORDER BY MAIL—

RUSH! The disk packages checked below plus the free 11x17 Peeks & Pokes Chart:

☐ Alpha Plot	$39.50	☐ Frame-Up	$29.50
☐ A.Mechanic	$29.50	☐ Tip Disk#1	$20.00
☐ Beagle Bag	$29.50	☐ Typefaces	$20.00
☐ DOS Boss	$24.00	☐ Utility City	$29.50
☐ Flex Text	$29.50		

(Add $1.50 Shipping, any size order. California, add 6% tax.)

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CITOH 8510	625.00
CITOH 1550	786.00
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COMPUTER OUTPOST

ON THE SCENE

New Products Announcements

Edited by David Szetela

YOUR APPLE CAN ANSWER THE PHONE AND TALK with the **VYNET V100 Interactive Voice Synthesizer.** The V100 card plugs into an Apple peripheral slot, and lets you automatically answer or dial telephone calls. The V100 equipped Apple can produce **natural-sounding speech,** with 300-1300 word vocabularies available. The user can respond in an interactive manner by using Touch-Tone signals. Retail price is $395 from **VNET Corporation, 2405 Qume Drive, San Jose, CA 95131, 408-942-1037.**

EDUCATIONAL SOFTWARE FOR EARLY CHILDHOOD is an electronic book to develop literary appreciation and verbal fluency. **Nursey Time** is a two-sided disk which incorporates a variety of graphics, color, animation and music in a total of **124 routines.** A thirteen page booklet suggests related learning activities in many areas including the **alphabet practice** built into the program. Price is $29.95 from **Merry Bee Communications, 815 Crest Drive, Omaha, NE 68046, 402-592-3479.**

DISK UTILITY SYSTEM FOR 35, 40, AND 70 TRACK DRIVES contains a disk drive speed check, disk drive test, **fast copy program,** and a sophisticated file manager. **The Filer** includes utilities to Copy Files, Copy Disk, Copy DOS, Delete, lock and unlock files, and Change Booting Program. Retail price is $19.95 from **Central Point Software, P.O. Box 19730-#203, Portland, OR 97219, 503-244-5782.**

NEW HI-RESOLUTION MONITOR features a video amp bandwidth of 20 MHz which results in a sharper, more precise screen image. The **BM-12EN** incorporates a non-glare green screen which adds sharpness to the image and lessens eye strain and fatigue from intensive use. The monitor is covered by a **one year warranty** program by which any faulty monitor will be repaired or replaced. For information contact **Leading Edge Products, Inc., 225 Turnpike Street, Canton, MA 02021, 800-343-6833.**

CLASSROOM NETWORKING SYSTEM allows up to 64 Apple II's to be connected using the Corvus Omninet interface. **Classroom Monitor** allows a teacher's workstation to monitor student workstations and act as a shared peripheral controller, providing **disk and printer sharing.** This allows the teacher to set up a programming demonstration on one screen and let other students' Apples monitor that screen. The teacher can look at any student's display on the teacher's monitor. The teacher can also **download BASIC or Pascal programs** into any or all Apples in the classroom. Retail price is $495.00 from **Software Connections, Inc., 1800 Wyatt Drive, Suite 17, Santa Clara, CA 95054, 408-988-3704.**

ADVENTURE GAME WITH GRAPHICS AND SPEECH lets you race the clock to complete your mission to save the world's first automated nuclear reactor. **Mission Impossible** features hi-res graphics in over **100 colors,** and support of the Votrax Type 'N Talk voice synthesizer for an Adventure that **talks.** Price is $29.95 from **Adventure International, Box 3435, Longwood, FL 32750, 305-862-6917.**

GRAPHICS PRINTER THAT WORKS WITH EVERY APPLE II PRINTER AND INTERFACE prints hi-res graphics in several different formats. **The Printographer** features horizontal and vertical cropping and uncropping, horizontal placement, **oval and diamond** cropping, and an option to print pictures directly to and from disk. Printographer routines can be included in your own programs, and files can be condensed to save disk space. Price is $49.95 from **Southwestern Data Systems, 10761-E Woodside Avenue, Santee, CA 92071, 714-562-3670.**

THE FIRST DIRECTORY OF EDUCATIONAL COMPUTING contains descriptions of periodicals, professional associations, on-going projects, funding, and many sources of ideas, information and materials. **The 1983 Classroom Computer News Directory of Educational Computing** includes a calendar of all national and regional events and conferences. Also included are guidelines for hardware and software evaluation and selection, and a complete yellow pages of computer services and products. For information contact **Classroom Computer News, 341 Mt. Auburn Street, Watertown, MA 02172, 617-923-8595.**

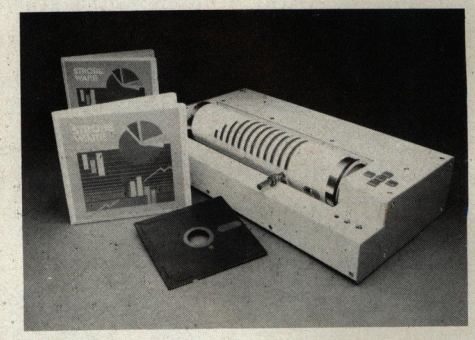
COMPLETE SPELLING VERIFICATION PROGRAM claims the largest diskette dictionary and includes a hardcover copy of the Random House dictionary. **The Sensible Speller** searches your word processor files and indicates the presence of mispelled words. Five versions are available for virtually all Apple II word processors, including Applewriter, Supertext, Word Handler, Wordstar, and the Pascal Editor. Price of each version is $125.00 from **Sensible Software, 6619 Perham Drive, West Bloomfield, MI 48033, 313-399-8877.**

COMPUTER ASSISTED INSTRUCTION FOR THE MENTALLY HANDICAPPED uses colorful animated graphics and synthesized speech to teach basic counting and word recognition skills to those with learning problems. Reading is not required except in lessons where it is one of the learning objectives. For information contact **The Upper Room Computer Consultants, 907 6th Avenue East, Menomie, WI 54751, 715-235-5775.**

NEW RELEASE OF THE SUPER-TEXT WORD PROCESSOR lets you choose 40, 56 or 70 column screen display without additional hardware. **Super-Text 40/56/70** includes a Character Designer feature that lets you create display characters such as foreign language letters and special symbols. Features of the original Super-Text are retained, such as multi-file search and replace, printer tab controls, and preview mode. For further information, contact **Muse Software, 347 N. Charles Street, Baltimore, MD 21201, 301-659-7212.**

A LEARNING GAME FOR YOUNG COMPUTER USERS teaches 5-8 year olds how to communicate with the computer and how the computer can be used to create and manipulate graphic images. **Face Maker** presents a blank face outline which the child can complete by selecting from menus of eyes, ears, hair, etc. Very simple programs can be written which will **animate the completed face** through a series of expressions, each with an appropriate noise. A memory development game is also included. Contact **Spinnaker Software, 26 Brighton Street, Belmont, MA 02178, 617-484-8444.**

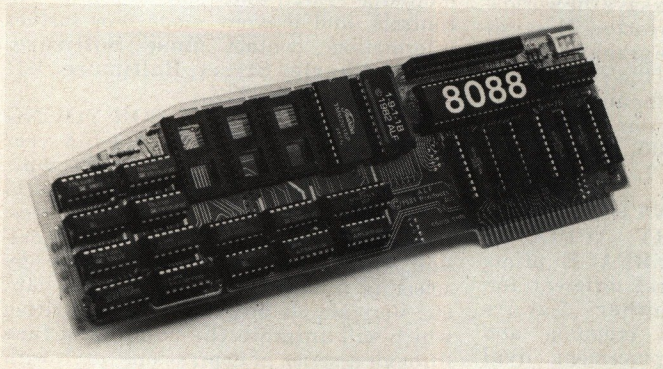
BUSINESS GRAPHICS ON THE STROBE 100 PLOTTER is possible with the **PIK Plotter Installation Kit** for use with the Apple II or Apple III. The PIK software allows all Apple Business Graphics to be drawn to the full 500 points per inch resolution of the Strobe 100 plotter, which accommodates any 8½ x 11 inch paper, transparency film for overhead projectors, or high quality material for reproduction as color prints or 35mm slides. In addition, users can utilize VisiCalc data files and automatically display and print data. For Information contact **Strobe, Inc., 897-5A Independence Avenue, Mountain View, CA 94043, 415-969-5130.**



PERSONAL COMPUTER INSURANCE covers hardware and software from a wide range of mishaps, from fire and theft to accidental damage, including power surges. The annual premium is approximately $60, with a $50 deductible. The cost of insurance for personal computers used for business is tax deductible. **CNGA's SAFEWARE** policy covers all hardware, software and media up to the amount stated by the owner. For more information, contact **Sherry Scott, Columbia National General Agency, 88 East Broad Street, Suite 1800, Columbus, OH 43215, 800-848-0598.**

continued on page 73

The speed and power of an IBM PC on a $345 Apple® card.



FAST 5 MHZ OPERATION, TRUE MULTIPROCESSING

ALF's AD8088 Processor Card adds a fast 16-bit 8088, the processor used in the IBM PC, to your Apple II. It runs programs from its on-board memory at a full 5 MHz—12% faster than the IBM PC—while the Apple also runs at full speed. And two or more AD8088's can be used in one Apple, to tackle problems that are beyond many mainframe systems.

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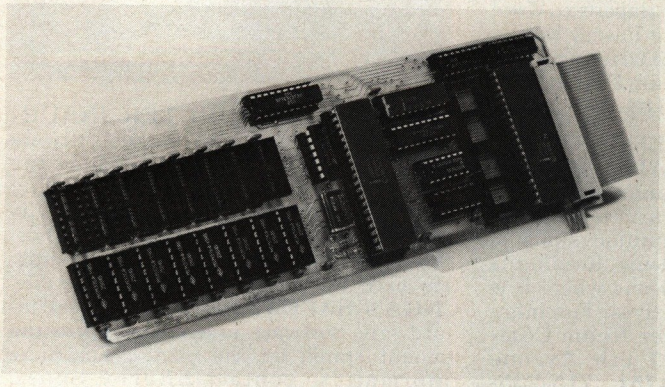

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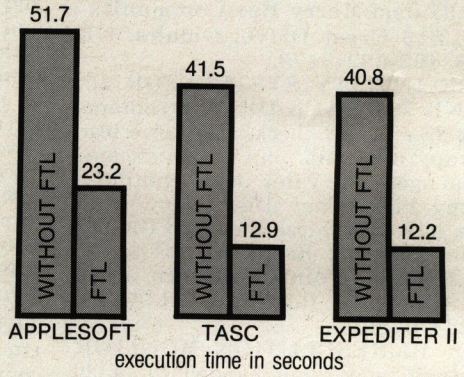
```
10 PRINT "2 3 ";
20 FOR B = 5 TO
   1000 STEP 2
30 FOR C = 3 TO
   SQR (B) STEP 2
40 IF B/C = INT
   (B/C) THEN 70
50 NEXT
60 PRINT B;" ";
70 NEXT B
```

Program to compute prime numbers from 2 to 1000.



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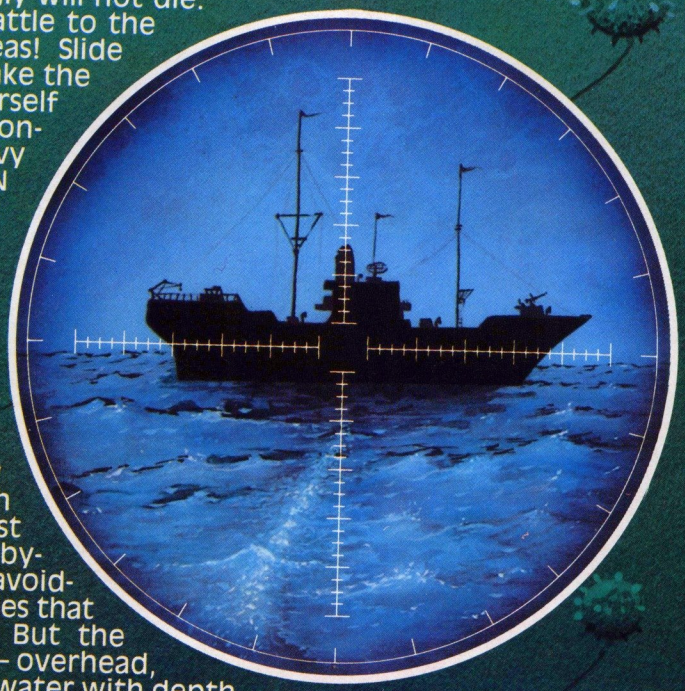

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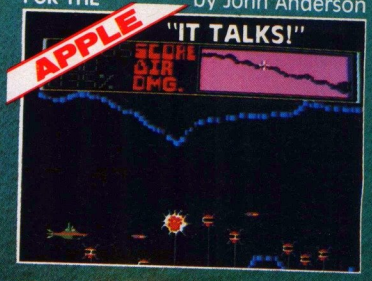

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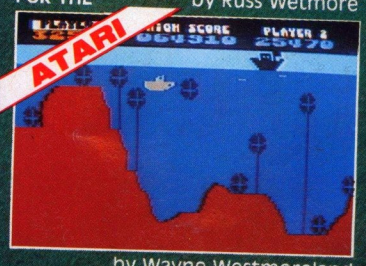

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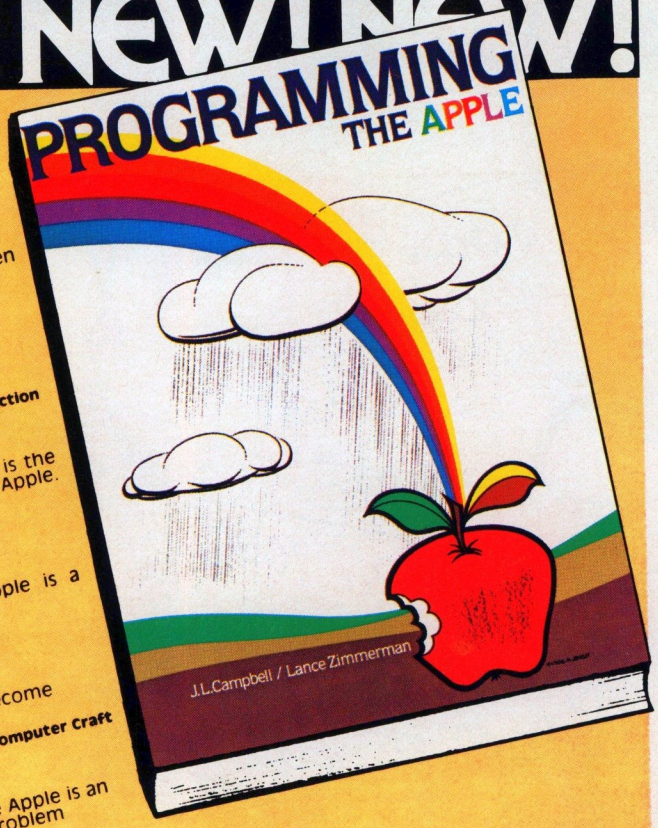

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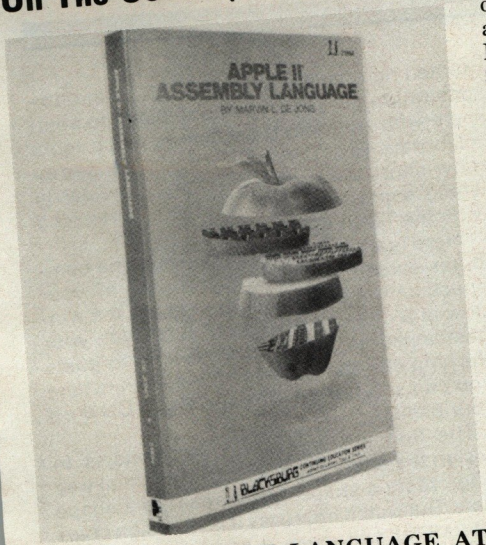

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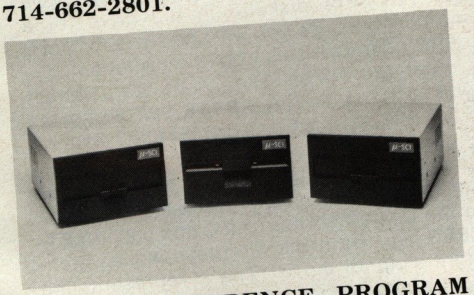

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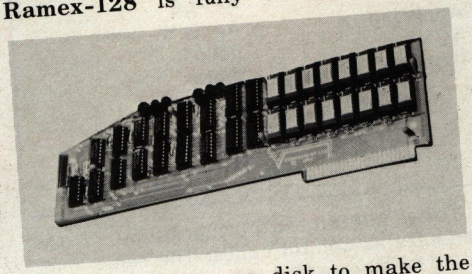

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FUN WITH TOOLKIT

Ship Shoot

by Rob Smythe
1522 Rusholme Cres.
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ED. NOTE: Featured program, SHIP SHOOT requires Toolkit support programs: HRCG; RBOOT; RLOAD; BYTE-CHANGED. SET; and WORLD MAP. PIC

INTRODUCTION

The title of this column, FUN WITH THE TOOLKIT, describes this issue's program very well. Instead of the various graphing programs that have been developed in earlier installments, this time we will make a game. This will involve the use of both high resolution pages, two different character sets, and the development of a pictorial character set with the TOOLKIT's ANIMATRIX program. We will also employ, as I promised in the last article, the HRCG's ability for "transparent" printing on top of a picture.

LOWER CASE LETTERS

Before we get to the game, however, I would like to answer a question that keeps arising in letters sent to me from NIBBLE readers. A common query is **"How do you produce lowercase letters with the TOOLKIT?"** The answer is very simple. Print a **CONTROL-K** on the screen and any characters that follow will be capitalized. Characters printed after a **CONTROL-L** will be lowercase. To shift only the very next character to uppercase, use a **CONTROL-S.**

Here are some examples, where the **K**, **S**, and **L** characters are control characters.

Type:	Appearance in listing	Produces on screen:
10 PRINT "KAPPLE"	**10 PRINT "APPLE"**	**APPLE**
20 PRINT "SAPPLE KII"	**20 PRINT "Apple II"**	**Apple II**
30 PRINT "LHELLO"	**30 PRINT "hello"**	**hello**
40 print "THERE"	**40 PRINT "there"**	**there**

"THERE" in line 40 comes out in lowercase because the **last control character** printed was the **CTRL-L** in line 30. If a line 35 is added that has a CTRL-K in it, then line 40 will print capitals.

Although the listing shows exactly what will appear on the screen, there are some disadvantages to placing your control characters right inside the string. For example, **if you wish to modify a line, you have to remember, when copying with the right arrow key, to retype the control letters.** The right arrow key only copies what appears on the screen (and the control characters are invisible). A second disadvantage is that some printers do strange things — perform form feeds or half-line advances — when printing out a listing containing imbedded control characters.

To overcome these drawbacks you can **use variables as control codes.** The same lines could be represented as:

```
5  CK$ = CHR$ (11): CL$ = CHR$(12):
   CS$= CHR$(19): REM THE CONTROL
   CODES
10 PRINT CK$"APPLE"
20 PRINT CS$"APPLE "CS$"II"
30 PRINT CL$"HELLO"
40 PRINT CL$"THERE"
```

THE SHIP SHOOT GAME

Now let's get to this issue's program. The listing at the end of this article is a program for a game similar to the "STAR WARS" game that some dealers used to supply to early purchasers of Apples. The game presented here, titled SHIP SHOOT, is for demonstration purposes. It is not meant to compete with the original, which is much more elaborate. But I think you will be surprised by how short the program is, and how easily some sophisticated "tricks" are performed with the TOOLKIT.

Here is what the game involves. The computer screen is the front window of your spacecraft, and you are looking out the window and chasing an enemy ship. With your games paddles or joystick, you try to guide the ship into the center of the screen, where you can shoot it by pressing **BUTTON 0** on your paddle.

The first job in making the game is to **design the enemy spacecraft**. The usual way is to create a shape and place it in a shape table. But watch how easy it is to design characters that can make a complicated figure using the ANIMATRIX program that came in your DOS 3.3 TOOLKIT. If you wish to skip this, you can still type in and run the program to study the other features. The ship will look rather strange, but the program will work.

CREATING THE SHIP

As I have said, the usual procedure for displaying a complicated drawing on the screen is to create a shape. Normally one uses a shape-making utility program, or resorts to brute force, and stores the shape in a table. The DRAW command places it on the screen. Anyone who has spent time inventing shapes that way has found out how tedious the process is. Watch how we can use the DOS 3.3 TOOLKIT to construct a complex structure and display it on the HIRES screen **WITHOUT using shape tables**. We will use the ANIMATRIX program from the TOOLKIT diskette to modify the character set **BYTE.SET**, so that **when we print certain "words", pictures will be drawn** on the screen instead!

First type **FP** to reset all your computer's pointers, make sure your joystick or paddles are plugged in, and **run ANIMATRIX**. Leave the TOOLKIT diskette in the drive for a moment because you will shortly load in one of the character sets from the diskette.

First you will be asked what character set you wish to edit. Enter **BYTE.SET** and press RETURN. After the disk drive is finished loading in the character set, a grid is drawn on the screen. You should see a little flickering cursor somewhere on the grid and the big cursor in the top left corner of the box called **LETTERS**. Touch the following keys, while watching the cursor move. (The → represents the right-arrow key.)

→→→→→→→→:Λ;→→→→(%)→→→→=!
→

The LETTERS box, the GRAPHIC box, and the grid should all show

```
:Λ;
(%)
=!-
```


continued on page 77

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Figure 1 shows the appearance of the screen after you have done this.

Now steer your little cursor with the games paddles through the grid, modifying the characters so as to produce an interesting **3 x 3 shape**. If you push **BUTTON 0**, a little square is **erased. BUTTON 1 fills** in a square. (I found that the characters reminded me of a wolf's head, so I changed the design into a wolf —a strange-looking spacecraft! But you can create any shape you wish.)

Figure 2 shows what my screen looked like after I had finished modifying the shapes of the letters I had first placed on the grid (the ones showing in the LETTERS box).

Here's what you are actually doing and why you are doing it! Remember that the TOOLKIT has many different character sets? There is an **ASCII.SET**, resident in ANIMATRIX, but you can load up to 9 other sets. This means that you can display text on the screen in a number of different **FONTS**, (differently-shaped letters).

For example, the set **BYTE.SET** produces the traditional computer style printing seen on the bottom of bank cheques. By first printing a **CTRL-A** and then the number of the character set, you can switch from one set to another. This is all done for you automatically in this issue's program, and is explained in the programming notes below.

HOW IT WORKS

As you use the ANIMATRIX program as described above, you are actually changing the shapes of the nine characters you entered into the letters box. When they are displayed on the screen, they will appear as shown in the **GRAPHIC box** in the lower right corner of the ANIMATRIX screen. The idea is to change the characters so that the design in the GRAPHIC box looks like a space ship. Then, whenever your program prints the letters shown in the LETTERS box on the screen, your ship will appear instead of the characters.

So go ahead: keep moving the little flashing cursor around the grid. Keep touching Buttons **1** and **0** to alter the designs of the colon, semicolon, etc. until you have an attractive-looking spaceship (or wolf!) in the GRAPHIC box.

SAVING YOUR SHAPE

When you finish altering the shape, touch **ESC**. Answer **NO** to the question **"SAVE AS BYTE.SET?"**, and when asked what name you want to give this modified character set, respond **BYTE-CHANGED.SET**, or whatever name you wish to call this character set in **line 970** of the program. **(Make sure there is room on the diskette for the new set.** You can save this new set on **any diskette**, not just the TOOLKIT diskette.) After the disk drive ceases operation, respond **YES** to the next query — you really do wish to **exit ANIMATRIX!**

THE PROGRAM, AND ACCOMPANYING UTILITIES

Now type in the program and save it. Before you run the program, you must place on the diskette the following programs: **HRCG, RLOAD, RBOOT, BYTE-CHANGED.SET, and a full page HIRES picture you select.** This picture must be the one named in **line 60**. In my line 60 I used **WORLD MAP.PIC**, which appears on your TOOLKIT diskette, but eventually you will probably want to create a picture showing a background of stars.

RUN the program. After choosing your level of difficulty, you will see your ship moving around the screen on top of the picture. It does not destroy the picture! But note that you did not have to XDRAW the shape, or reconstruct the picture when you moved it. The spaces around the characters in the string **SHIP$** in **line 140** print on top of the ship when it moves. But they print "transparently" on top the image that is already in the same screen location on Page 2 (which in this case is your background picture)! You accomplished this with **line 210**. It's simple!

Figure 1

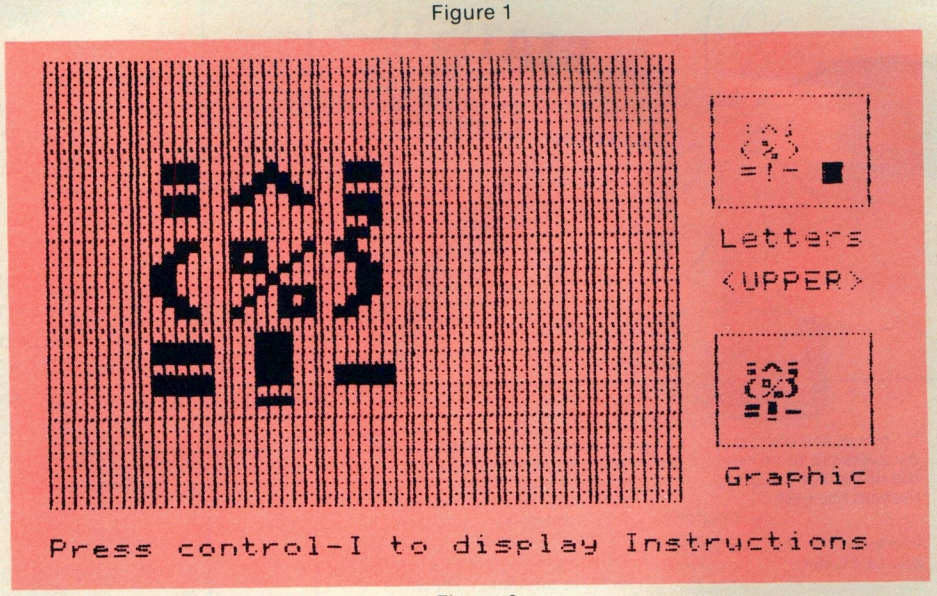
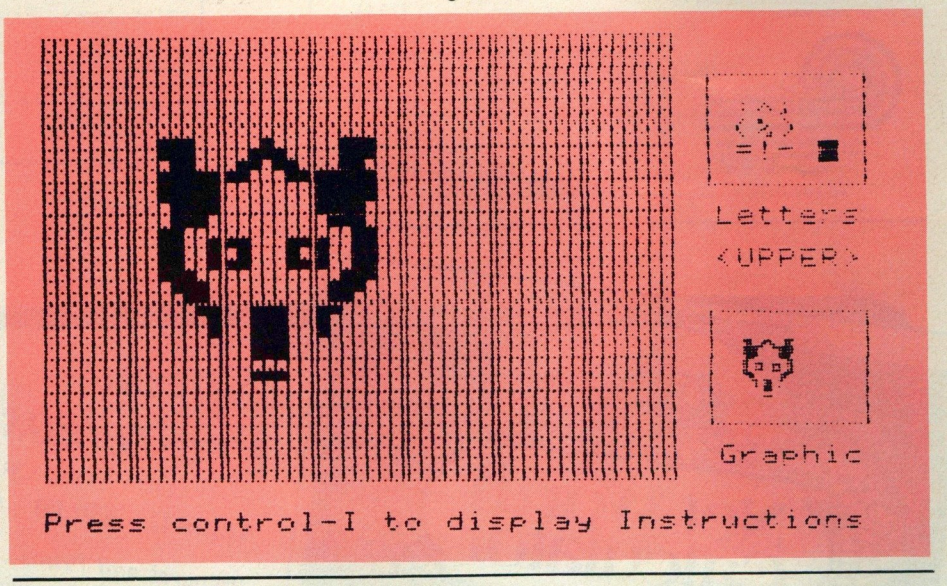


Figure 2



PROGRAM DETAILS

The SHIP SHOOT program is extensively REMed. (As usual, no REMs are referenced by the program so you can leave them out at your option.) Most of the important programming steps are self-evident, but here are a few notes to help you track through the program.

Lines 40-70 Load in HRCG (only the first time the program is run).

Line 140 Sets up SHIP$ string. **CB$ (CTRL-B)** tells the computer to consider the current cursor position as the effective left edge of the text window. The **CC$**'s are carriage returns with line feeds, but only to the **CB$** location. The effect is to quickly print a **5 x 5 block** on the screen. This of course is your 3 x 3 ship surrounded by blanks (which will erase the ship when it is moved one position in any direction. The **CD$** ends the Block Display mode, returning the text-window to normal.

Line 200 Initializes value. **AA** and **BB** are the starting horizontal and vertical positions of the ship. Change starting values for **ENERGY%** and **AMMO** if you wish a longer game or more shots.

continued on next page

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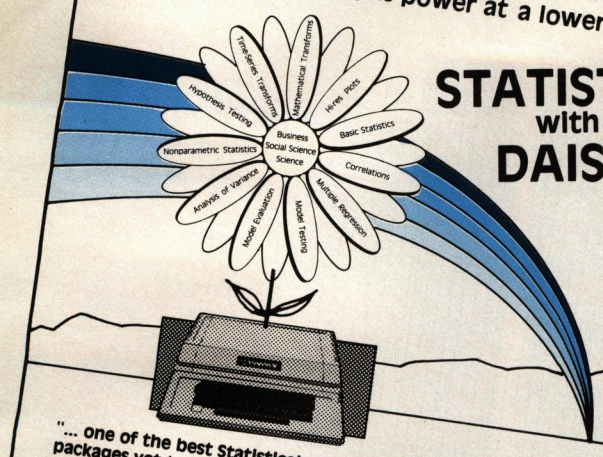

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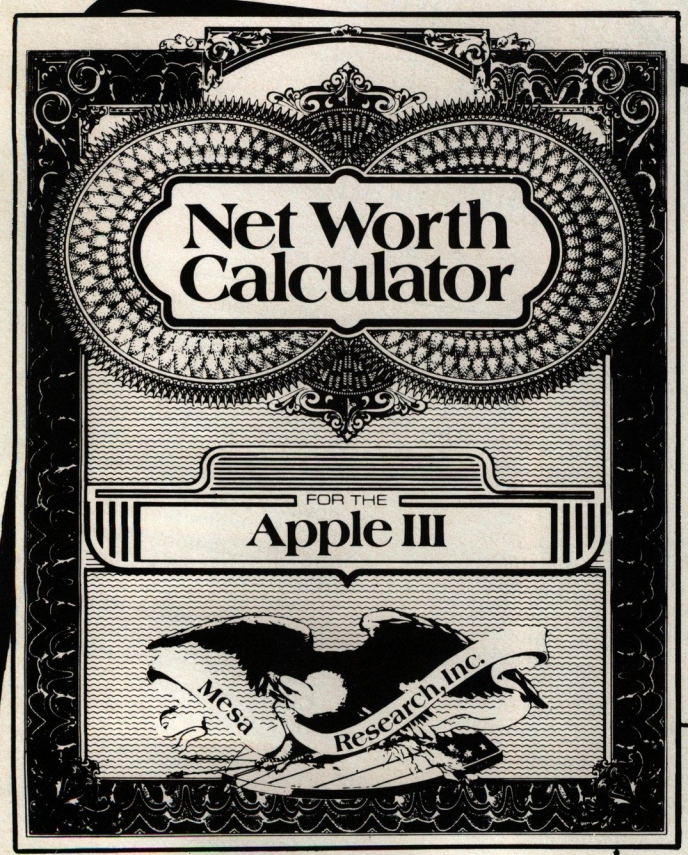

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Ship Shoot (Cont.)

Line 210 Changes to transparent printing. **CP$** is clear-the-screen. This really prints spaces on the entire screen. But with transparent printing, it prints what is on Page 2 in the same screen location onto Page 1, effectively transferring a copy of Page 2 to Page 1. (It's still available on Page 2.)

Line 220 The program comes up with ASCII SET resident. We switch to **BYTE-CHANGED.SET** with this **CTRL-A1** statement (no space between the CONTROL A and the digit). You'll find a **CTRL-A0** in lines **680** and **730** which switch us back to ASCII.SET.

Lines 370-420 Change **AA** and **BB** and check that they are not outside proper limits.

Line 330 Press any key to get out of the game.

Line 370, 400 Increase **AA** by **1**, unless **PA < AA**, in which case decrease it by **1 (+1-2=-1)**. Do likewise with PB.

Line 430 Draw the ship. That's all you need to do!

Line 460 Give the ship two random moves to your one if level of difficulty is **2**.

Line 510 Convert the 0-255 paddle values to 1-39 and 1 for HTAB, and 1-23 for VTAB.

Lines 680, 730 **CONTROL-A ZERO** — back to ASCII.SET.

PN$ — normal printing (non-transparent, not on top of what's on Page 2.

CP$ — clear the screen, this time normally.

MODIFICATIONS AND OTHER USES

An obvious thing to do is to **create an explosion** when you hit the ship with your laser beam. It's easy. Go back to ANIMATRIX and choose some other characters to modify so as to make, say, a 6 x 6 explosion. Then **print it at HTAB AA, VTAB BB.** (That's where the ship was. Then print a 6 x 6 block of spaces. The screen will just show the background were the ship used to be.)

Can you see how you *could turn this* into a shooting gallery type of game, with various creatures moving across the screen? You don't have to worry about replacing the background behind the moving object.

In another application, if you have drawn a graph and have to label it, place it on Page 2. Use this technique to move it to Page 1. Then add your labels. You can erase and change your labels without destroying the graph. And by clearing the entire screen, your labels disappear but the graph doesn't! When it is labeled to your satisfaction, save Page 1, to save the labeled graph.

```
10  REM  *********************
11  REM  *    SHIP SHOOT     *
12  REM  *   BY ROB SMYTHE   *
13  REM  * COPYRIGHT (C) 1982 *
14  REM  * BY MICRO-SPARC INC *
15  REM  * LINCOLN, MA. 01773 *
16  REM  *********************
19 :
20  REM  SET UP PROGRAM
30 :
40  IF  PEEK (768) +  PEEK (769) =  PEEK (770) THEN 80: REM
      SKIP UNLESS FIRST RUN
50  GOSUB 890: REM  INIT HRCG
60  PRINT  CHR$ (4)"BLOAD WORLD MAP.PIC,A$4000": REM  PICTUR
    E ON PAGE 2
70  POKE 768,1: POKE 769,2: POKE 770,3: REM   SPECIFIC GARBA
    GE POKED WHERE LINE 10 CAN DETECT IT AND SKIP INITIALIZING A
    ND PICTURE-LOADING ROUTINES
80  PRINT  CHR$ (16); CHR$ (11)
90  HGR : POKE  - 16302,0
100 KB =  - 16384: REM  KEYPRESS
110 G$ =  CHR$ (7): REM  BELL
120 BU =  - 16286: REM  BUTTON 0
130  GOSUB 1080: REM  INITIALIZE HRCG CURSOR CONTROLS
140 SHIP$ = CB$ + "     " + CC$ + " :^; " + CC$ + " ($) " +
    CC$ + " =!- " + CC$ + "     " + CD$
150 :
160  REM  START OF GAME
170 :
180  PRINT CP$: VTAB 10: PRINT "LEVEL OF DIFFICULTY (1 OR 2)
     ? ";: GET A$: PRINT A$
190 LEVEL =  VAL (A$): IF LEVEL < 1 OR LEVEL > 2 THEN  PRINT
     G$;: GOTO 180
200  POKE  - 16368,0:AA = 20:BB = 10:ENERGY% = 100:AMMO = 10
210  PRINT PT$CP$: REM  TRANSPARENT WRITING, CLEAR SCREEN -
     PUTS PAGE 2 PICTURE ON PAGE 1
220  PRINT CA$1: REM  SWITCH TO CHARACTER SET 1 (BYTE-CHANGE
     D.SET)
230  VTAB 2: HTAB 2: PRINT "ENERGY: "
240  VTAB 2: HTAB 31: PRINT "AMMO: "AMMO
250 :
260  REM  MAIN GAME LOOP
270 :
280  GOSUB 510: REM  FIND PADDLE POSITION
290 ENERGY% = ENERGY% - 1: VTAB 2: HTAB 10
300  HTAB 10: PRINT ENERGY%" "
310  IF ENERGY% = 0 THEN 730
320  GOSUB 560: REM  FIRE?
330  IF  PEEK (KB) > 128 THEN  PRINT PN$CA$0CP$: POKE  - 163
     68,0: END : REM  EARLY EXIT
340 :
350  REM  MOVE TOWARD PADDLE POSITION
360 :
370  IF PA = (AA) THEN 390
380 AA = AA + 1 - 2 * (PA < AA)
390  IF PB = BB THEN 410
400 BB = BB + 1 - 2 * (PB < BB)
410  IF BB > 19 THEN BB = 19
420  IF AA > 35 THEN AA = 35
430  HTAB (AA): VTAB (BB): PRINT SHIP$
440  GOSUB 560: REM  FIRE?
450  GOSUB 800: REM  MOVE TARGET
460  IF LEVEL = 2 THEN  GOSUB 800: REM  MOVE AGAIN
470  GOTO 280
480 :
490  REM  FIND PADDLE POSITION
500 :
510 PA =  PDL (0):PB =  PDL (1):PA =  INT (PA / 255 * 38 + 1
    ):PB =  INT (PB / 255 * 22 + 1)
520  RETURN
530 :
540  REM  FIRE IF BUTTON PUSHED
550 :
560  IF  PEEK (BU) < 128 THEN  RETURN : REM  BUTTON NOT BEIN
     G PUSHED
570  HCOLOR= 5
580  HPLOT 10,190 TO 140,95 TO 269,190
590  FOR J = 1 TO 10: NEXT
600  HCOLOR= 0: HPLOT 10,190 TO 140,95 TO 269,190
610 AMMO = AMMO - 1: VTAB 2: HTAB 37: PRINT AMMO;" "
620  IF AMO = 0 THEN 680
630  IF AA < 18 OR AA > 20 OR BB < 10 OR BB > 11 THEN  RETUR
     N : REM  NO HIT UNLESS TARGET IS WITHIN THESE CONSTRAINTS
640 HIT = HIT + 1: PRINT G$;: RETURN
650 :
660  REM  POST MORTEM - OUT OF AMMO
670 :
680  PRINT CA$0PN$CP$: VTAB 10: PRINT "OUT OF AMMUNITION": P
     RINT : PRINT "NUMBER OF HITS ... "HITS
690  GOTO 740
700 :
710  REM  POST MORTEM - OUT OF ENERGY
720 :
730  PRINT CA$0PN$CP$: VTAB 10: PRINT "OUT OF ENERGY": PRINT
      : PRINT "NUMBER OF HITS ... "HITS
740  VTAB 20: PRINT "PLAY AGAIN (Y/N)? ";CE$;: GET A$: PRINT
      A$
750  IF A$ = "N" THEN  END
760  GOTO 180
770 :
780  REM  RANDOM MOVE OF SHIP
790 :
800 X =  INT ( RND (1) * 3 - 1):Y =  INT ( RND (1) * 3 - 1):
    AA = AA + X: IF AA > 35 THEN AA = 35
810  IF AA < 1 THEN AA = 1
820 BB = BB + Y: IF BB > 19 THEN BB = 19
830  IF BB < 1 THEN BB = 1
840  HTAB (AA): VTAB (BB): PRINT SHIP$
850  RETURN
860 :
870  REM  INITIALIZE HRCG
880 :
890  ONERR  GOTO 1010
900  TEXT : HOME : VTAB 12: HTAB 10: PRINT "SHIP SHOOT BY RO
     B SMYTHE": VTAB 14: HTAB 15: PRINT "PLEASE WAIT....":ADRS =
     0
910  PRINT  CHR$ (4);"BLOAD RBOOT": CALL 520
920 ADRS =  USR (0),"HRCG"
930  POKE 216,0
940  IF ADRS < 0 THEN ADRS = ADRS + 65536
950 CS = ADRS - 768: HIMEM: CS
960 D$ =  CHR$ (4)
970  PRINT D$;"BLOAD BYTE-CHANGED.SET,A";CS
980 CH =  INT (CS / 256):CL = CS - CH * 256
990  POKE ADRS + 7,CL: POKE ADRS + 8,CH: CALL ADRS + 3
1000  RETURN
1010  TEXT
1020  PRINT "ERROR IN RLOAD OR RBOOT"
1030  POKE 216,0
1040  STOP
1050 :
1060  REM  CURSOR CONTROL VARIABLES
1070 :
1080 CA$ =  CHR$ (1):CB$ =  CHR$ (2):CC$ =  CHR$ (3):CD$ =
     CHR$ (4):CE$ =  CHR$ (5):CF$ =  CHR$ (6):CI$ =  CHR$ (9):CK$
      =  CHR$ (11):CL$ =  CHR$ (12):CN$ =  CHR$ (14):CO$ =  CHR$
     (15):CP$ =  CHR$ (16):CS$ =  CHR$ (19):CT$ =  CHR$ (20)
1090 CV$ =  CHR$ (22):CW$ =  CHR$ (23):CY$ =  CHR$ (25):CZ$
     =  CHR$ (26)
1100 P1$ = CO$ + CA$:P2$ = CO$ + CB$:PT$ = CO$ + CT$:PN$ = C
     O$ + CP$
1110  REM  P1$ - DISPLAY PAGE 1
1120  REM  P2$ - DISPLAY PAGE 2
1130  REM  PT$ - TRANSPARENT PRINTING
1140  REM  PN$ - NORMAL PRINTING
1150  RETURN
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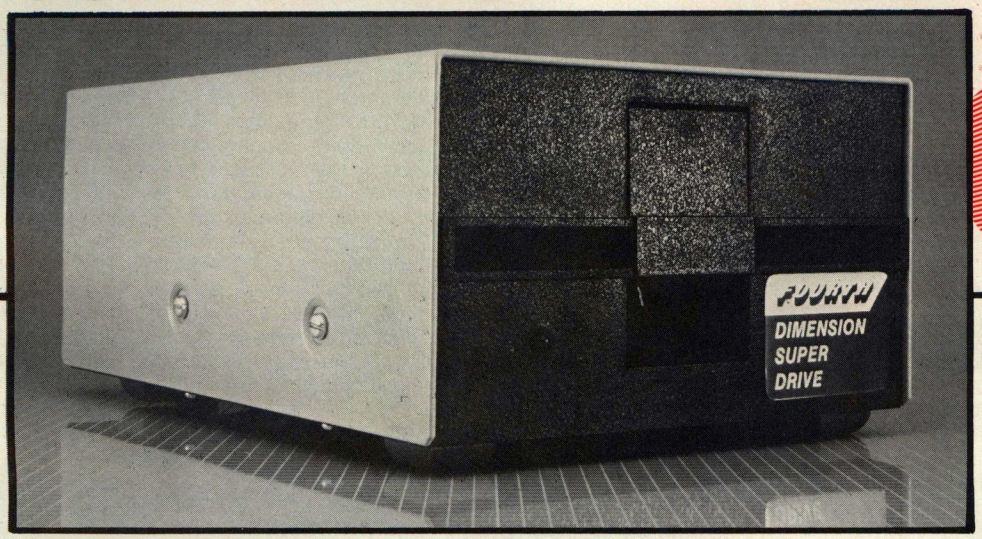

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This advice is not, as some have suggested, merely a subterfuge with our fingers crossed behind our backs...a subtle signal to potential purchasers to buy LOCKSMITH to begin a career of formal, largescale piracy, or just an informal, small scale barter club. DON'T use LOCKSMITH either for piracy or the barter club, and here's why.

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So don't buy LOCKSMITH for piracy, but only to make archive copies. But we'll go even further. We think it doesn't make a lot of sense to buy LOCKSMITH to make archive copies of any program which is published with a reasonable backup policy. If a backup is included with the original disk, and no-fault replacements are available at nominal cost, why spend $100 to purchase LOCKSMITH? If a company is charging $5 per copy for a replacement disk (we charge $3, for LOCKSMITH) it takes a lot of blown disks to make up the $100 LOCKSMITH price. Probably more than you'll ever have.

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NIBBLING AT APPLESOFT

Editing and Debugging.

by Leslie R. Schmeltz
3224 Magnolia Ct.
Bettendorf, IA 52722

Our programming efforts thus far have been primarily devoted to problem solving. We have attempted to identify problems and solve them with simple computer programs which illustrate some of the commands being discussed. This article will deal with other sorts of problems — those created **while** trying to write programs to solve problems! Call them errors, mistakes, bugs, boo-boos or (as some ancient Scots did) "ghoulies, ghosties and things that go bump in the night."

Whatever you decide to call them, errors are those troublesome little creatures that seem to elude your best efforts at finding them. A few errors, like typing mistakes, can be readily located and corrected. Others are less obvious. I have had some obscure errors in programs that took hours of digging to find! Am I the only programmer who makes errors on a fairly regular basis? Not bloody likely! Any programmer who claims never to have made any errors is either omnipotent (unlikely)) or something less than totally honest (bingo!).

In this article, we will be discussing the process of tracking down and eliminating errors (more commonly referred to as "bugs") in your programs. Fortunately, Applesoft has provisions for both detection and correction of most programming errors. Error messages and editing features help to make the process of modifying programs as painless as possible. The title of this article refers to "editing and debugging." As you may have guessed, "debugging" refers to the process of locating and eliminating bugs. Editing, on the other hand, refers to actually changing program lines so that they will operate as intended.

HOW DO YOU KNOW YOU HAVE A PROBLEM?

Sounds like the set-up line for a comedy routine, doesn't it? One can almost visualize some comedian standing there listing the ways you can tell: "You know you have a problem when your computer gets LOADed," or "You know you have a problem when your computer tells you when to RUN!." Seriously, as they say, there are many ways to tell when you have a problem. Some of the most effective tools are built into the operating and language systems of your Apple.

Detecting the presence of errors in an Applesoft program or immediate execution line takes place **at the time of program execution**, NOT when the line is typed! In essence, this means you can type just about anything as long as a line number precedes it! If you have not already developed the habit, **a lot of time and effort can be saved by carefully reading each line you type before pressing RETURN**.

The usual means of informing you of a problem is through the use of an "Error Message," a noxious little statement that appears when particular types of problems are encountered. For immediate execution lines, this is no problem since the error can usually be located with little difficulty. Programs, however, are quite another story. Once a program has been typed, error trapping must take place during trial RUNs unless you take time to examine a LISTing for possible errors. It is important to note that **error messages cover only the language requirement portions of a program or statement. Flaws in logic or program design will usually not surface without more extensive debugging procedures**, as we will discuss a little later.

In this article, we will outline a **three step process** for detecting and rectifying the most common programming errors. The next installment of this series will focus on tape and disk storage error handling.

THREE STEPS TO BECOMING A SLIP-UP SLEUTH

Rather than keep you dangling for the next few paragraphs, let's outline the steps first and explain them further as we go along. In order to become a "super slip-up sleuth," you will need to be able to identify the **SOURCE** of an error, determine it's **NATURE** and formulate some **SOLUTION** to the problem noted. Boy, if Watson had such a simple formula, you might never have heard of Holmes!

The **SOURCE** of an error is, of course, a program line. The trick is finding **which** program line! If you recall our discussion of **LIST** (NIBBLE Vol. 3, No. 3), you have at least one way of locating errors. For those who don't recall (or didn't read) the earlier discussion, let's take a few lines and review some of the uses of the LIST command:

LIST (RTN) will display the entire program in memory, starting with the lowest numbered line and proceeding toward the highest. To examine a portion of a program, type LIST followed by two numbers (separated by commas) representing the lowest and highest line numbers for display. For instance,

LIST 0,20

will display all the lines from 0 to 20 (inclusive) on the screen. To examine a single line, type LIST followed by the number of the line desired. A LISTing may be terminated by typing **CTRL-C** at any time.

As noted in our earlier discussion, LIST displays program lines in extremely rapid succession on the video screen. Displaying a few lines at a time or resetting the display rate with the **SPEED=** command will allow you to read the listing. Hopefully, you have had some time to experiment with the various forms of LIST and are quite familiar with them. If not, take a few minutes now and get better acquainted with LIST — it is one of the most valuable commands available for editing and debugging purposes. We will return to LIST a little later and expand on it some more at that time.

ERROR MESSAGES.

Remember we described error messages as noxious little statements? On a practical level, they are also the primary method of determining the NATURE of problems noted in program lines. As noted earlier, error messages appear when a statement attempts to execute — not when it is typed. This is a distinct "pain" at times, since you need to repeatedly attempt to RUN a program in order to locate and correct any errors that it may contain.

Applesoft error messages, by the way, are identified by a **question mark** preceding them. The format is **?XX ERROR** for immediate execution lines and **?XX ERROR IN (line #)** for program lines. In both cases, **XX** is an error description given by Applesoft. Although the messages are not exactly prize winning prose, enough information to determine the nature of an error is presented. Probably the most common of the Applesoft error messages is **SYNTAX ERROR**, a catch-all that describes lines missing punctuation or parentheses, having illegal characters, etc. Of all the error messages, SYNTAX ERROR is the one you will be likely to see the most. Let's take a look at some of the others:

BAD SUBSCRIPT
CAN'T CONTINUE
DIVISION BY ZERO
FORMULA TOO COMPLEX
ILLEGAL DIRECT
ILLEGAL QUANTITY
NEXT WITHOUT FOR
OUT OF DATA
OUT OF MEMORY
OVERFLOW
REDIM'D ARRAY
RETURN WITHOUT GOSUB
STRING TOO LONG
TYPE MISMATCH
UNDEF'D STATEMENT
UNDEF'D FUNCTION

Remember that error messages for deferred execution (program) lines indicate the line number in which the error is located. What easier way to find the source of a problem? In those instances where fairly obvious errors are located, the line numbers are displayed for your convenience. Now that we have a method of locating the source of a problem, let's take a little closer look at what the error messages are telling us about its nature.

BAD SUBSCRIPT appears when you attempt to reference an array element outside the dimensions specified in your **DIM** statement. If no **DIM** statement is used, remember that Applesoft automatically assigns a maximum subscript of 10 for each dimension used.

CAN'T CONTINUE shows up when you attempt to CONTINUE a program after a line has been added or deleted, an error occurred or no program is in memory.

DIVISION BY ZERO. Dividing by zero is not only an error, it's impossible (as any third grade math student will tell you!).

FORMULA TOO COMPLEX. If you are attempting to use more than two IF...THEN statements at once, this error surfaces.

ILLEGAL DIRECT occurs when you try to use a deferred execution only command in immediate mode. **INPUT, DEF FN, GET** and **DATA** are some of the commands that can be used only in deferred execution mode and will trigger this error message.

ILLEGAL QUANTITY refers to an out of range parameter passed to a math or string function. Negative array subscripts, any of the string functions with an improper argument, negative SQR's or PEEKs and POKES

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Editing and Debugging (Cont.)

to non-existent locations will trigger this message.

NEXT WITHOUT FOR, like pizza without cheese or pie without ice cream, is a definite no-no! Quite often this error is triggered when NEXT statements are contained in conditional program lines which execute repeatedly.

OUT OF DATA tells you that a READ statement was executed, but all the DATA statements in the program had already been read. Either you set up too many READ statements or neglected to include sufficient data.

OUT OF MEMORY. This is another of those catch-all error messages that can be triggered by any number of problems. Among them are program too large, too many variables, expressions nested too many levels deep, LOMEM too high, HIMEM too low, too complicated an expression, etc., etc.

OVERFLOW informs you that the result of a calculation was too large to be represented in Applesoft's number format. Conversely, an underflow (a number too small to be represented in Applesoft's number format) returns zero as the result and program execution proceeds merrily along without an error message being displayed.

REDIM'D ARRAY means that another DIM statement was encountered for an array that was already dimensioned in the program. Often this error occurs because an array element was used, resulting in Applesoft assigning a default dimension of 10, before the desired DIM statement was executed.

RETURN WITHOUT GOSUB is pretty self-explanatory. If you end a series of lines with RETURN, designating a subroutine, this error message will occur if that series of lines executes for any other reason than a GOSUB command.

STRING TOO LONG is simple mathematics. Applesoft permits string expressions of **up to 255 characters** in length, period. If you attempt to concatentate two strings whose total length exceeds 255, or set up a program line which attempts to stretch a string, this message curtly informs you of the "String Limit".

SYNTAX ERROR is another of those catch-all error messages that can give you fits! Some of the more common reasons it appears — missing parenthesis in an expression, illegal character, incorrect punctuation, etc., etc.

TYPE MISMATCH deals with numeric and string expressions and tells you, in effect, that the two don't mix! Assignment statements require the same type of expression on either side of the equals sign. Functions which expect a string argument are not happy when they receive a numeric one and vice versa. Most often, at least in my own experience, this error is triggered by forgetting to put the required **"$"** on string expressions.

UNDEF'D STATEMENT tells you that the statement line number that was referred to in a GOTO, GOSUB or THEN statement does not exist.

UNDEF'D FUNCTION reminds you that a user-defined function must indeed be defined by the user before it will function! (Pardon me, I just couldn't resist lightening up a little after discussing all these ominous messages!)

FORMULATING SOLUTIONS

As we have discussed, the Applesoft Error Messages will inform you of both the source and nature of problems they recognize. It is incumbent on you, the programmer, to formulate some type of solution to the problem. Actually, in most cases, the solution is the simplest part of the whole process. If you are able to provide a lonely **NEXT** with it's **FOR**, remove the offending **DIM** for a redimensioned array, insert a **GOSUB** for each **RETURN** and keep your strings to less than 255 characters — most problems will be readily resolved.

Somewhat more intensive efforts are often required to locate the offending illegal quantity, type mismatch, memory error or undefined statement. Once the root of the problem is identified, however, the solution is just as obvious as the simpler errors.

At this point, we are intentionally avoiding the discussion of errors in program logic and design. We will assume, for purposes of this section, that your logic is flawless and the program will operate as intended once the language requirement errors have been resolved.

LINE EDITING

So far, we have been discussing the process of locating and eliminating program errors (debugging). Let's switch gears for a few lines here and talk about actually **changing the characters in a program line (editing)**. The end result of debugging procedures is the need to revise or replace statements in a program. This is where editing comes in to play.

Remember **LIST**? Comes in kind of handy when an error message tells you there is a problem in line so-and-so, right? The obvious way to see what is contained in the line is to type **LIST (line #)**. After you examine what is displayed on the screen, you have two choices — **delete and retype the line or correct the error in the existing line**. If you would like to delete and retype the line (actually not such a bad idea for short, simple lines), just type the line number followed by the corrected statement and press RETURN. The line number in memory will be replaced with the one just typed. To check the new line, type LIST (line #) again.

For more complicated lines, it may be preferable to correct the error rather than retype the line. Applesoft provides several editing functions to enable you to do this. You already know about the right and left arrow keys on the keyboard, right? Remember the left arrow key erases characters from memory with each cursor move and the right arrow key copies the character at the cursor for each move. There is a way to move the cursor around on the screen without affecting anything displayed there or in memory. The escape key (**ESC**) is used in conjunction with four other keys to move the cursor in any desired direction. Try it — list some program line on your display and press the following key sequences:

ESC K
ESC J
ESC M
ESC I

Did the cursor move around the screen? Notice that with each sequence, the cursor moves one position, **ESC K** moves the cursor

continued on page 87

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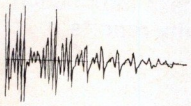

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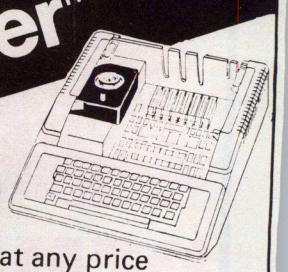

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Editing and Debugging (Cont.)

to the **right, ESC J** to the **left, ESC M** moves it **down** and **ESC I** moves it **up**. Try it a few more times. Remember that nothing in either the screen display or in memory is being affected by these moves. Once you have the feel of moving the cursor to any desired position on the screen, we will do some actual line editing.

AN EXAMPLE

Ok, now you have the feel of moving the cursor. Let's try some editing. Type NEW and the following line on your computer:

10 RAM THIS LINE CONTIANS TWO ERRORS

Now type **RUN**. Got an error message, right? Know why? Sure, RAM is not a legal command. It should be REM. Let's correct it:

Type LIST
Move the cursor up to the "1"
Move the cursor to the "A" (right arrow key)
Press "E"
Copy the rest of the line (right arrow key)
Press RETURN
Type LIST

Was the problem corrected? Notice the word **REM** is now spelled correctly. Type RUN. Nothing happened? That's as it should be, since no error message was generated and this program really doesn't do anything! But what about the second error in line 10? The word **CONTAINS** is obviously misspelled. See if you can correct it using essentially the same process as that outlined above. Take a few minutes to experiment with a few other program lines and correct simple errors in them. The process you are following will become second nature with enough use. Come on back when you're comfortable with the process and we'll build on it a little.

CORRECTING THE LINES

Now you've corrected characters in the text of a line. The next most logical process is to learn to add and delete characters within a program line. The process is not nearly as simple. Let's start with delete and explain why. Suppose your program line read:

10 REMARK THIS IS A PROGRAM

Obviously this is an error, since **REM** is the proper way to designate a remark statement. We want to delete the **ARK** portion of this command. How do we go about it? Type **LIST** and position the cursor on the **"1"** as before. Now press the right arrow to copy the characters through **REM**. When the cursor reaches the **"A"**, press **ESC K** until the space following **"K"** is reached. Then press the **right arrow key** to copy the rest of the line. Remember, the **ESC K sequence does not copy what is under the cursor**. Type **LIST** again and the **"ARK"** portion of REMARK should be gone. If not, try the process again until satisfactory results have been obtained.

INSERTING CHARACTERS

Inserting characters into a program line is somewhat more complicated. Let's say, for the sake of illustration, that you wanted to **add THIS IS A** to the **line 10 REM PROGRAM**. Easy? Hardly, but possible. Type **LIST** and get line 10 displayed on the screen. Now use **ESC K** to move the cursor to the **"1"** and press the right arrow until the space between REM and PROGRAM has been reached. At that point, press **ESC I** to move the cursor above the line and type **THIS IS A**. Now press **ESC M** to move the cursor back down to the original line and **ESC J** repeatedly until the cursor is again back at the starting point. Now press the right arrow and copy the rest of the line. Press **RETURN** and try **LIST** again to see whether the desired results have been obtained. If so, congratulate yourself with a quick trip to the larder. If not, try it again (and again and again) until the proper operation has been accomplished.

Although it is not a complicated process, the use of the ESC functions and the right and left arrow keys can be somewhat confusing. Practice until you feel confident with the procedures involved! It may not be the most efficient editing process in the world, but it is readily available, at least. Take some time and experiment with all the editing commands discussed — they will be your primary means of correcting program errors and revising program lines. Despite the awkward nature of the commands, they do indeed work as advertised.

SELF-TEST

Can you locate the errors in the lines listed below? Type them into your Apple and see if it does as well.

10 PRIMT "THIS IS A PROGRAM LINE;"

20 A(12) = 4 * 7

30 A$= A + B

40 PRINT TAB(10); THIS LINE HAS A PROBLEM

50 A = 3 * (4 + 7) /3)

Of course, those few were easy! Spend some time writing lines that contain errors and see how your Apple reacts. Learn just how each error affects the computer and what is needed to correct it! Believe me, your time will be well spent when actual program errors are encountered.

SUMMARY

To this point, our discussion of editing and debugging has been limited to langauge related errors. If you are to be a successful programmer, the requirements of the language must be satisfied before any of your programs will even begin to execute. Once you have learned the language and how to satisfy its requirements, we will look a little further at possible errors in program logic and design.

MAJOR POINTS

Editing and Debugging.

1. Editing refers to the actual changing of program lines so they will operate as intended.
2. Debugging is the process of locating and eliminating program errors, more commonly known as "bugs".

Becoming a Slip-Up Sleuth.

1. Three factors for handling program errors are: identifying the Source of an error, determining its Nature and formulating some Solution to the problem.
2. The Source of a program error is a program line. The secret, of course, is determining which program line is creating the problem!
3. LIST is used to examine program lines for possible problems. Even error messages refer to a specific line which can be examined through the use of the LIST command.
4. The Nature of a program error is pretty much described by the Error Message which it triggers.
5. Applesoft lines are evaluated for possible errors when they attempt to execute, NOT when they are typed. Almost any statement preceded by a line number is readily accepted during the input phase of program construction. Typing RUN will evaluate each line for any possible errors.
6. Error messages describe the nature of an error and its location in a program line. Applesoft error messages are preceded by a question mark.
7. Applesoft error messages are triggered by language requirements, not errors in program logic or design.

Line Editing.

1. LIST is used to explain the contents of a program line prior to its being edited.
2. Editing refers to the process of actually changing the contents of a program line.
3. Correcting the contents of simple lines is done by merely re-typing the line and pressing RETURN. This replaces the line in memory with that which has just been typed.
4. The left arrow key on the keyboard erases characters from memory with each cursor move.
5. The right arrow key on the keyboard copies the character at the cursor with each cursor move.
6. Pressing ESC followed by each of the following four keys permits cursor moves without altering the contents of display or program memory: ESC K (right), ESC J (left), ESC M (down) and ESC I (up).
7. To add or delete characters from a program line, the ESC sequences must be made to locate the cursor properly. Each use of the left or right arrow key alters the contents of both the screen display and memory.

COMMANDS DISCUSSED

Most of the commands discussed are relatively familiar, since we have used them before. Those discussed in this installment:

CTRL-C
ESC K
ESC J
ESC M
ESC I
LIST
SPEED=

WHAT'S NEXT?

As we mentioned earlier, we will be discussing some of the problems associated with the use of mass storage (disk and tape) next time. After that we will look a little more carefully at errors in program logic and design. In the meantime, take enough time to experiment with the messages and procedures discussed in this installment. The ability to deal effectively with program errors will serve you well in any type of programming effort.

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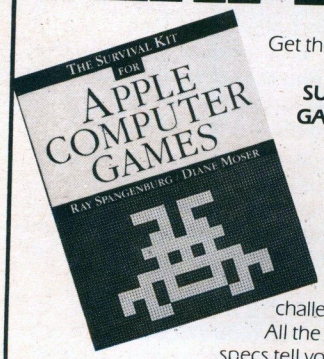

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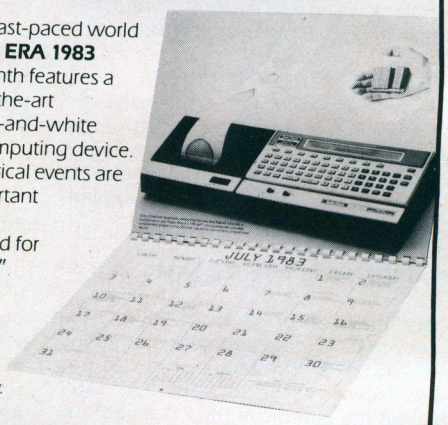

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CTRL T *to Truncate a Line from the Cursor to the End of the Line.*

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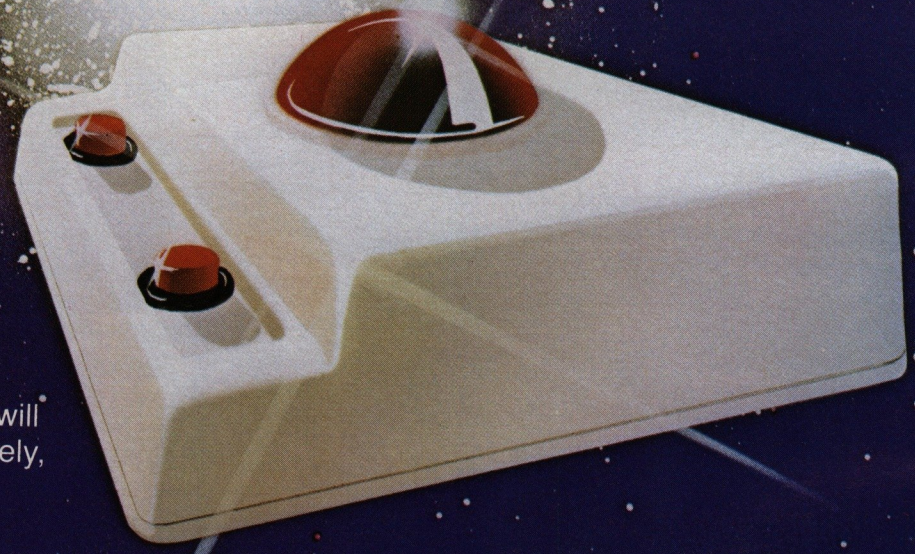

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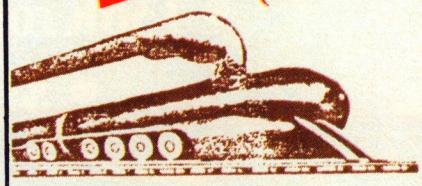

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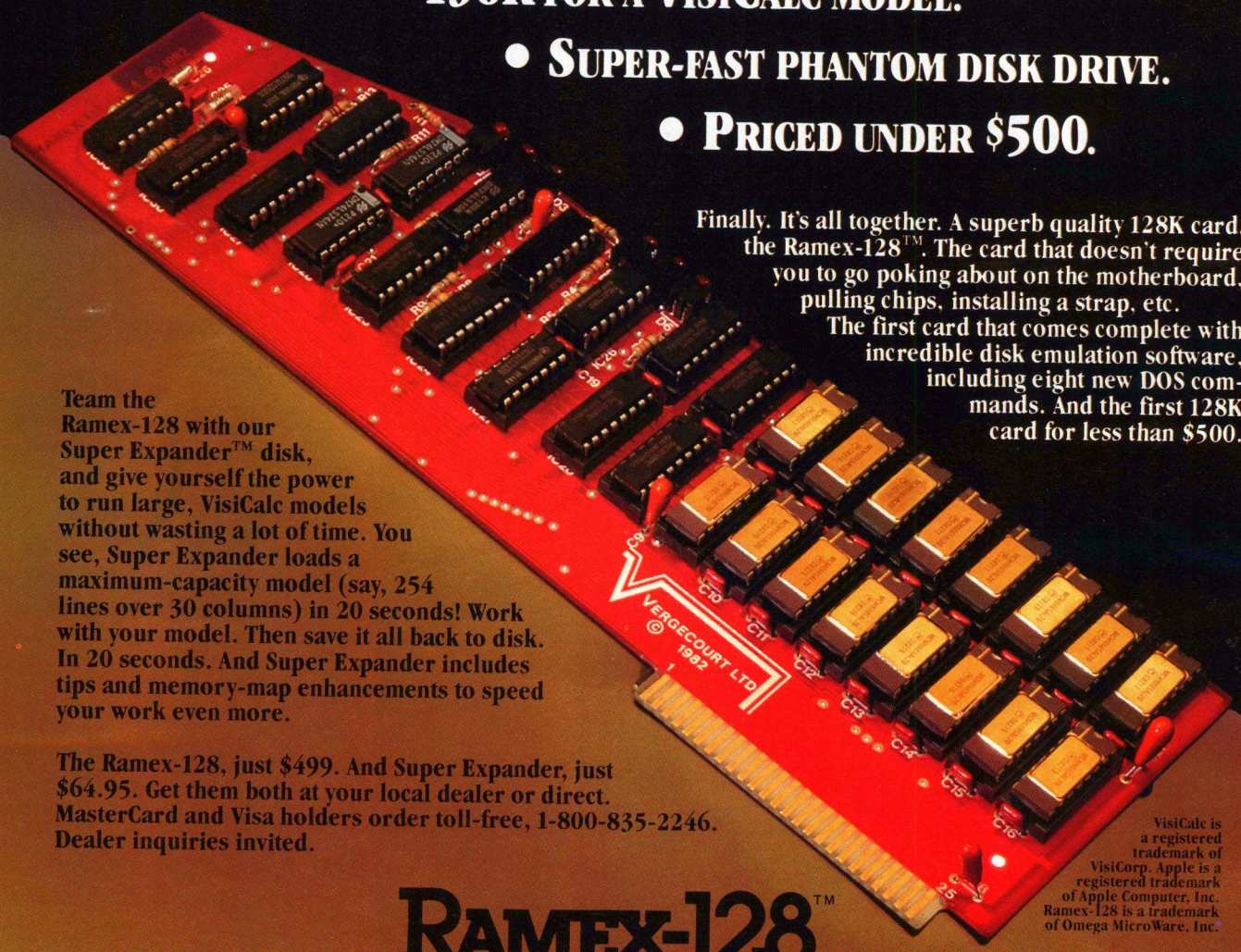

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by Bill Fortenberry
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THE SHAPE to the rescue! THE SHAPE is an Applesoft program that allows you to create, view, edit, and save shape tables. The shapes built by the program are in the standard hex format and can be used in any Applesoft, Integer or assembly language program.

HOW TO BUILD A SHAPE TABLE

The complete instructions for building a shape table are found in the Applesoft reference manual (Programmer's Aid #1 manual for Integer), but to get everyone going, I will give a summary of them here. The first step is to decide on a shape and draw it on graph paper. Now pick a starting point and begin drawing arrows that point from one dot to the next, and only turn on 90 degree angles (these arrows are usually called **the vectors** of the shape). The arrows must then be coded as a 3 digit binary number (which must then be coded as an 8 bit byte). One of the problems with shapes is the way you cram these 3 bit numbers down to 8 bits (THE SHAPE does this for you).

After each byte is set, you must build the **shape table index**. Like the index in a book, the shape table index tells where each shape is located. When you finish the index, you are ready to call the monitor, enter the table, exit the monitor, test the shape, see that it's wrong, look at your arrows again, look at your numbers again, check each byte again, find one mistake, enter the monitor, type the table, exit the monitor, test the table, see that it's wrong, look at your arrows again, look at your numbers again, check the bytes again, sell your Apple, buy a Northstar. If doing all of the above does not appeal to you, read on.

LO-RES TO HI-RES

Late one night, after I had been trying for about 4 hours to set up a shape table for a new game, I decided to write a program to do the actual coding and typing for me. Since I wasn't going to code the vectors myself, I needed a way to get the shape some place where the computer could "see" it. I chose the LO-RES screen mainly because of the availability of the **SCRN** function. This enabled me to **"see" each dot on the screen**.

Next I had to get the shape on the screen. Out of this need came a simple horizontal and vertical line drawing routine. (I always draw a shape on graph paper so the lines are easy to see.) Now, how would I code the shape? Since Apple shapes are picky about moving up two consecutive (no plot) spaces in a row, and since I had the problem of trying to put 9 bits of information in an 8 bit word, I decided to **scan the shape right to left, and top to bottom. This totally eliminates any vectors with a value of zero** (the signal for the end of the shape table), and when poking the vectors in memory I only put two vectors in a byte.

My goal with THE SHAPE was to write a program that would give the user a completed shape table (index + definitions) while requiring minimum input.

INSTRUCTIONS FOR THE SHAPE

OPTION ONE — BUILD A SHAPE TABLE

When you run the program, a menu will appear with 2 options. Let's take option one and build a table (I'll talk about option two later.) First, the text page will disappear and the blank graphics page will be displayed. At the bottom of the screen, you will be asked if you want the **turtle** or **line mode**. Here is how the **line mode** works.

After you pick **line mode**, the screen will display:

HLIN FROM PLOT

This means that you are in the **horizontal line mode** with the **plot on.** Type a **5** and press return. The Apple replies with **TO**. Now type a **9** and press return. Next the screen displays **ON**. Type **7** and press return. This will draw a **horizontal line from 5,7 to 9,7** (it's the big red line toward the top of the screen).

Now type a **V** and hit return. The screen should say:

VLIN FROM PLOT

You are now in the **vertical line mode** (these modes act just like **HLIN** and **VLIN** in BASIC). Try the same sequence of numbers as above. Did you get a vertical line?

Type an **E** and return. The screen will display:

HLIN FROM ERASE

Any lines you draw now will be black (or erased). Notice that you returned to the HLIN mode.

Now try an **F** and press return. Where did that white square come from? This is the **free cursor mode**. Type some **I's, J's, K's and M's** and the cursor should move around the screen. Press the **P** key. Now when you move the cursor it should leave a red dot. Now put the cursor in the middle of one of your lines, hit the **E** key, and move the cursor. It should have left a black dot. When you press **P** or **E** in the **free mode**, it will **plot** or **erase** the point the

continued on next page

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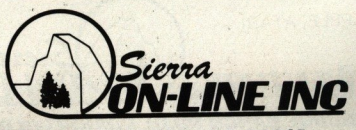

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The Shape (Cont.)

cursor is on. By the way, the **coordinates of the cursor** are displayed at the bottom of the screen. The free mode is designed for touching up shapes and finding coordinates for the line statements. To exit from the free mode, press **Q**. In any mode, you may press the question mark key to get a list of available commands.

When you are in the HLIN or VLIN mode, pressing Q will cause the program to start coding your shape.

The screen will now display:

LOCATING SHAPE EDGES

The program is now finding the top, bottom and sides of the shape. After a while, it will display:

CODING PLOT VECTORS

The program is now looking at each dot on the screen and coding it as a number. Then the screen will show:

POKING SHAPE DEFINITION

The numbers that represent your shape are being combined and poked into memory.

When the screen shows:

THIS DEFINITION STARTS ON THE WHITE DOT. PRESS RETURN TO PLOT SHAPE

You should find the white dot and mark its position on your graph paper. This is where the Apple will begin to draw your shape (the coordinates in the DRAW statement).

SHAPE DISPLAY

We are now ready to see the shape. Press Return and enter the **scale** and **rotation** just as you would in a BASIC program. Choose the color selection with the **first letter** of the desired color and press Return. You should now see your shape in glorious HI-RES graphics. When you press Return, the program will ask if you want to draw the shape again. If you press **Y**, you can enter new coordinates, etc. and redraw it. If you answer **N**, the computer will ask if you want to edit the shape. If you didn't like the way it looked, answer **Y** and you will go back to the edit mode. If you are satisfied with the shape type an **N**.

Now the Apple will ask if you want to keep this shape as a **base** for the next shape. If, for example, you are building a series of shapes that will show a man walking. Since only the legs will move, why should you have to redraw the head and torso for each figure? With THE SHAPE you don't have to. Just answer **Y** to the question and you will be put right back into the Enter mode. (**Except** that the last shape is now stored safely away) and you are looking at the next shape in line. Now just change the position of the legs, and proceed to the next shape in the sequence.

THE TURTLE MODE

If you select the **Turtle mode** instead of the Line mode, the screen will display:

MOVE TO START AND PRESS 'P'

Use the **'I', 'J', 'K' and 'M' keys to move the cursor to where you want to start** your shape, and then press **'P'**. The screen will display:

PLOT ON
X=xx Y=yy

This tells you that the **plotting** is turned ON and gives you the values for the **x** and **y** coordinates. Just keep pressing the cursor keys to draw your shape. To turn the plot OFF, just press **'E'**. If you make a mistake while drawing in the turtle mode, the **ESC** key will cause the cursor to **back up** along your shape and erase the errors.

LINE VS. TURTLE

In the **line mode**, the computer starts to code your shape when you push the **'Q'** key. In the **turtle mode**, the computer **follows every plot as you make it.** Because of this, the turtle mode will **code** a shape faster (if you draw it with a minimum of moves).

With the **turtle mode**, you **don't** get to use one shape as a base for another. Also, if you choose to edit a shape, you must start over with a blank screen.

The beginner will feel safer with the line mode, while an experienced programmer will want to use the turtle mode to draw more efficient shapes. No matter which mode you use, the computer will generate an index for you. After you have finished your table, the computer will give you the commands to save your shape Table.

OPTION TWO — THE POKE CALCULATOR

When you build a Shape Table with this program, the Shape Table is stored in HI-RES page one. When you load the table back into memory to use with your own program, you must put it in another memory location.

Remember that when you use a Shape Table with Applesoft, you must **poke the address of the table into locations 232 and 233.** The POKE calculator will make this easier for you. When you select Option Two from the main menu and enter the address where you want to put the table, the program will show you what POKES to use in your program.

MEMORY USAGE BY THE SHAPE

In order for this program to work properly you must have a 48K machine. The program resides from LOMEM up to HI-RES page one. Page one of HI-RES is reserved for the shape table as it is being built. Page Two is used to show the shape, and all memory above page Two is set aside for variable storage. This program does **not** contain an **ONERR GOTO** section (to conserve space), but input is checked and most bad input is ignored. You should become familiar with the program before building a large shape Table.

VARIABLES USED IN THE PROGRAM

Most of the variables serve double duty to conserve memory, but here are some of the primary variables:

A$	**— input string**
SN	**— number of shapes in the table**
SS	**— Shape Table starting location**
G	**— array to hold shape vectors**
SD	**— array that holds the starting location of each definition**
SC	**— loop counter (counts up to # of shapes in table)**
QQ	**— throw away variable**
B & C	**— input in line mode**

continued on next page

3. How long was this product on the top thirty?

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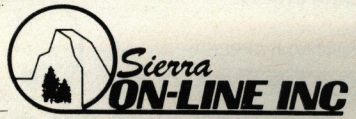

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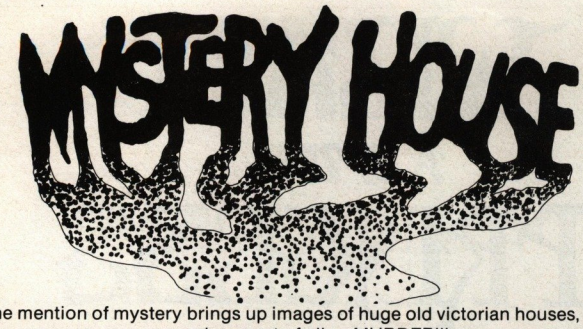
4. What valuables await the wise detective in this classic adventure game?



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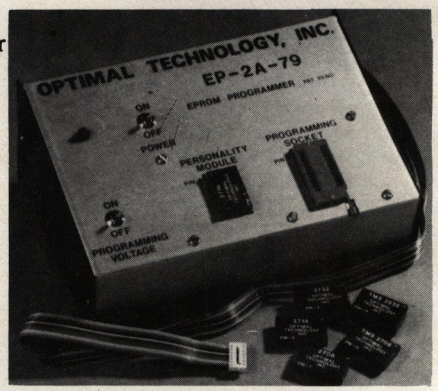

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The Shape (Cont.)

X & Y — screen coordinates
ZC — old screen color
CZ — current screen color
X,Y & Z — misc. pointers

THE PROGRAM LOGIC

The program does not have many comments because of memory limits. The table below should help you decipher the program section and their logic.

80-180	These lines display the title page
200-270	Display the menu and accept the user's input
290-390	Find out how many shapes are in the table
410-460	The main program loop
480-710	Draw a horizontal line or branch to Vlin or Free Cursor
730-960	Same as above for vertical lines
980-1420	Free cursor + turning ON or OFF individual points
1190-1360	Make an imaginary box around the figure
1380-1630	Scan shape and fill array G with shape vectors
1650-1830	Poke the shape vectors into memory
1850-1980	Let the user view the shape and set up the index
2000-2180	Let the user edit and use the shape again
2200	Foot of the main loop
2220-2310	Print details about the table and BSAVE command
2320-2400	Plot and erase subroutines for the line mode
2420	General purpose text centering subroutine
2440-2520	Calculate POKE values for the user
2540-2610	A short hex to decimal converter
2630-2970	The code for the Turtle mode

The Shape is by no means complete. Many things were intentionally omitted because they had already been done or would have required program chaining. The shape coding algorithm could also be improved, although it works fine in the present form. Hopefully, THE SHAPE will give other programmers a basis for developing better shape table utilities.

continued on next page

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5. How would you get past a pink bull?

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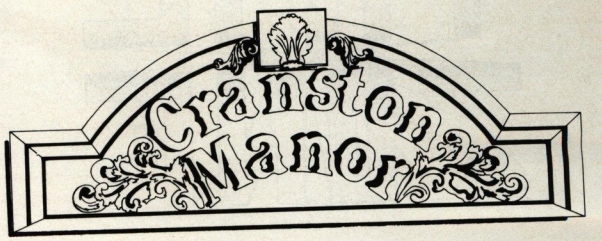

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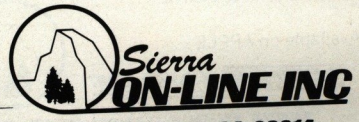

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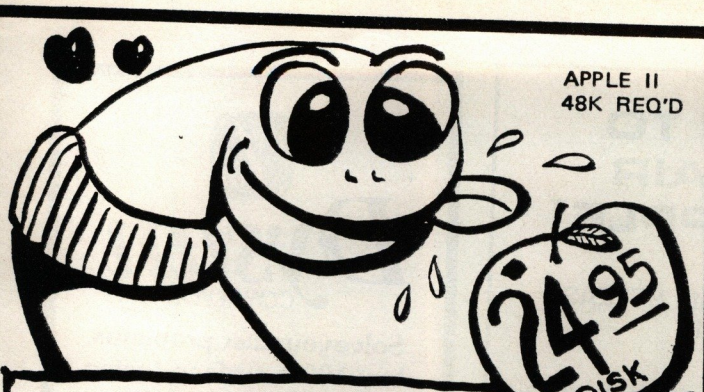

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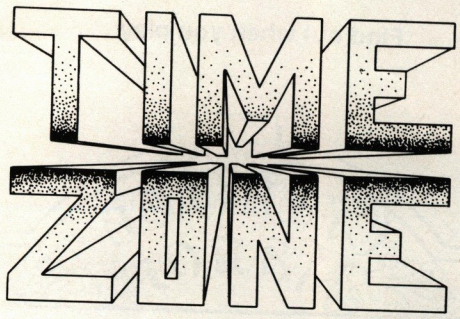

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The Shape (Cont.)

The Shape, LightSabre Battle, Price Demo, Scroll, and Lower Case Writer are available on diskette for an introductory price of $17.95 plus $1.50 shipping/handling ($2.50 outside the U.S.) from NIBBLE, P.O. Box 325, Lincoln, MA 01773. Offer expires Jan. 31, 1983.

```
10  REM   ********************
20  REM   * THE SHAPE        *
30  REM   * BILL FORTENBERRY *
40  REM   * COPYRIGHT (C) 1982 *
50  REM   * BY MICRO-SPARC INC *
60  REM   * LINCOLN, MA. 01773 *
70  REM   ********************
80  LOMEM: 24576
90  TEXT : HOME : PRINT "*********************************
    *****"
100  FOR I = 2 TO 12: VTAB I: PRINT "*"; TAB( 40);"*": NEXT
110  VTAB I
120  PRINT "****************************************"
130  INVERSE :A$ = "                    ": VTAB 3: GOSUB 2420: VTAB 5
     : GOSUB 2420
140  VTAB 4: INVERSE :A$ = " THE SHAPE ": GOSUB 2420: NORMAL
150  VTAB 7:A$ = "APPLE II SHAPE TABLE UTILITY": GOSUB 2420
160  VTAB 9:A$ = "BY: BILL FORTENBERRY": GOSUB 2420
170 A$ = "(C) 1982 BY MICRO-SPARC, INC.": VTAB 11: GOSUB 242
    0
180  POKE 34,13
190  REM

200  VTAB 15: PRINT "WOULD YOU LIKE TO": PRINT : PRINT "                    MENU
     1.   BUILD A SHAPE TABLE": PRINT "     2.   CALCULATE POKE
     VALUES": PRINT "     3.   INSTRUCTIONS & DEMO"
210  PRINT : INPUT "TYPE THE NUMBER (1-3) OF YOUR CHOICE
     =->";A$
220  IF A$ = "" THEN 200
230 A =  VAL (A$)
240  IF A < 1 OR A > 3 THEN 200
250  HOME
260  IF A = 3 THEN  PRINT  CHR$ (4);"RUN SHAPE INSTRUCTIONS"
270  IF A = 2 THEN 2430
280  REM
                    GATHER DATA
290  VTAB 17: INPUT "HOW MANY SHAPES IN THIS TABLE  ";SN$
300  IF SN$ = "" THEN 290
310 SN =  VAL (SN$)
320  IF SN <  = 0 THEN 290
330 SS = 10300
340  REM  POKE SHAPE LOCATION
350  POKE 232,SS -  INT (SS / 256) * 256
360  POKE 233, INT (SS / 256)
370  DIM G(1445),SD(SN + 2)
380 SD(1) = SS + 2 + SN * 2
390  GR : POKE 34,20
400  REM
                    LOOP FOR # OF SHAPES
410  FOR SC = 1 TO SN
420 QQ =  FRE (0)
430  GR : HOME : POKE 34,20: HOME
440  HOME : PRINT "SHAPE #";SC: PRINT "T)URTLE OR L)INE MODE
     (T/L) ": INPUT "";A$: IF A$ = "T" THEN 2620
450  COLOR= 1:F = 0
460  HOME : PRINT  TAB( 33)"PLOT": POKE 33,30
470  REM
                    HLIN MODE
480  HOME : PRINT "HLIN FROM ";: INPUT "";A$
490  IF A$ = "" THEN 480
500  IF A$ = "V" THEN  HOME : GOTO 730
510  IF A$ = "F" THEN 980
520  IF A$ = "P" THEN 2330
530  IF A$ = "E" THEN 2370
540  IF A$ = "Q" THEN 1190
550  IF A$ = "?" THEN 2980
560  PRINT "TO ";: INPUT "";B$
570  IF B$ = "" THEN 560
580  IF B$ = "?" THEN 2980
590 B =  VAL (B$)
600  IF B > 38 THEN B = 38
610  IF B < 1 THEN B = 1
620  PRINT "ON ";: INPUT "";C$
630  IF C$ = "?" THEN 2980
640  IF C$ = "" THEN 620
650 C =  VAL (C$)
660  IF C > 38 THEN C = 38
670  IF C < 1 THEN C = 1
680 A =  VAL (A$)
690  IF A < 1 THEN A = 1
700  IF A > 38 THEN A = 38
710  HLIN A,B AT C: PRINT : HOME : GOTO 480
720  REM
                    VLIN MODE
730  INPUT "VLIN FROM ";A$
740  IF A$ = "" THEN 730
750  IF A$ = "H" THEN  HOME : GOTO 480
760  IF A$ = "F" THEN 980
770  IF A$ = "P" THEN 2330
780  IF A$ = "E" THEN 2370
790  IF A$ = "Q" THEN 1190
```

```
800  IF A$ = "?" THEN 2980
810  INPUT "TO ";B$
820  IF B$ = "?" THEN 2980
830  IF B$ = "" THEN 810
840 B =  VAL (B$)
850  IF B > 38 THEN B = 38
860  IF B < 1 THEN B = 1
870  INPUT "AT ";C$
880  IF C$ = "?" THEN 2980
890  IF C$ = "" THEN 870
900 C =  VAL (C$)
910  IF C > 38 THEN C = 38
920  IF C < 1 THEN C = 1
930 A =  VAL (A$)
940  IF A < 1 THEN A = 1
950  IF A > 38 THEN A = 38
960  VLIN A,B AT C: PRINT : HOME : GOTO 730
970  REM
                    FREE CURSOR MODE
980 X = 20:Y = 20
990 ZC =  SCRN( X,Y): COLOR= 15: PLOT X,Y
1000  POKE 33,40
1010  HOME : PRINT "X=";X;"  Y=";Y
1020  GET A$
1030  IF A$ = "Q" THEN  COLOR= ZC: PLOT X,Y: GOTO 2330
1040  IF A$ = "P" THEN ZC = 1: GOTO 1020
1050  IF A$ = "E" THEN ZC = 0: GOTO 1020
1060  IF A$ = "?" THEN 3040
1070 XX = X:YY = Y
1080  IF A$ = "I" AND Y > 1 THEN YY = Y - 1: GOTO 1130
1090  IF A$ = "M" AND Y < 38 THEN YY = Y + 1: GOTO 1130
1100  IF A$ = "J" AND X > 1 THEN XX = X - 1: GOTO 1130
1110  IF A$ = "K" AND X < 38 THEN XX = X + 1: GOTO 1130
1120  GOTO 1020
1130 CZ =  SCRN( XX,YY)
1140  COLOR= 15: PLOT XX,YY: COLOR= ZC: PLOT X,Y:X = XX:Y =
     YY
1150 ZC = CZ
1160  HOME : PRINT "X=";X;"  Y=";Y
1170  GOTO 1020
1180  REM
                    BOX IN SHAPE
1190 L = 0:Z = 0
1200  POKE 33,40: HOME
1210  PRINT "LOCATING SHAPE EDGES"
1220  FOR D = 1 TO 39: IF  SCRN( L + 1,D) = 1 THEN Z = 1
1230  NEXT
1240  IF Z = 0 THEN L = L + 1: GOTO 1220
1250 J = 39:Z = 0
1260  FOR D = 1 TO 39: IF  SCRN( J - 1,D) = 1 THEN Z = 1
1270  NEXT
1280  IF Z = 0 THEN J = J - 1: GOTO 1260
1290 Z = 0:K = 39
1300  FOR D = 1 TO 39: IF  SCRN( D,K - 1) = 1 THEN Z = 1
1310  NEXT
1320  IF Z = 0 THEN K = K - 1: GOTO 1300
1330 Z = 0:I = 0
1340  FOR D = 1 TO 39: IF  SCRN( D,I + 1) = 1 THEN Z = 1
1350  NEXT
1360  IF Z = 0 THEN I = I + 1: GOTO 1340
1370  REM
                    CODE SHAPE
1380 Z = 1:D = 1:X = L:Y = I + 1
1390  PRINT "CODING PLOT VECTORS"
1400 X = X + 1:SX = X:SY = Y: IF  SCRN( X,Y) = 0 THEN 1400
1410 BX = X:BY = Y
1420  GOTO 1440
1430 X = X + D
1440  IF D = 1 AND X = J - 1 AND  SCRN( X,Y) = 1 THEN G(Z) =
     6:Y = Y + 1:D =  - D:Z = Z + 1: GOTO 1490
1450  IF D = 1 AND X = J - 1 AND  SCRN( X,Y) = 0 THEN G(Z) =
     2:Y = Y + 1:D =  - D:Z = Z + 1: GOTO 1490
1460  IF D =  - 1 AND X = L + 1 AND  SCRN( X,Y) = 0 THEN G(Z
     ) = 2:Y = Y + 1:D =  - D:Z = Z + 1: GOTO 1490
1470  IF D =  - 1 AND X = L + 1 AND  SCRN( X,Y) = 1 THEN G(Z
     ) = 6:Y = Y + 1:D =  - D:Z = Z + 1: GOTO 1490
1480  GOTO 1580
1490  IF Y >  = K THEN 1630
1500 F = 0
1510  FOR B = L TO J
1520  IF  SCRN( B,Y) = 1 THEN F = 1
1530  NEXT B
1540  IF F = 0 THEN G(Z) = 2:Y = Y + 1:Z = Z + 1: GOTO 1490
1550 F = 0
1560  IF Y >  = K THEN 1630
1570  GOTO 1440
1580  IF  SCRN( X,Y) = 1 AND D = 1 THEN G(Z) = 5:Z = Z + 1
1590  IF  SCRN( X,Y) = 1 AND D =  - 1 THEN G(Z) = 7:Z = Z +
     1
1600  IF  SCRN( X,Y) = 0 AND D = 1 THEN G(Z) = 1:Z = Z + 1
1610  IF  SCRN( X,Y) = 0 AND D =  - 1 THEN G(Z) = 3:Z = Z +
     1
1620  GOTO 1430
1630 G(Z) = 10
1640  REM
                    POKE SHAPE
1650 A = SD(SC)
1660 T = A
1670 Z = 0
1680  PRINT "POKING SHAPE DEFINITION"
1690 Z = Z + 1
1700  IF G(Z) = 10 THEN 1790
1710 K = G(Z):Z = Z + 1
1720  IF G(Z) = 10 THEN 1780
1730 K = K + G(Z) * 8:Z = Z + 1
1740  IF G(Z) = 10 THEN 1780
1750  IF G(Z) < 4 AND G(Z) > 0 THEN K = K + G(Z) * 64:Z = Z
     + 1
1760 Z = Z - 1
1770  POKE A,K:A = A + 1: GOTO 1690
1780  POKE A,K:A = A + 1
1790  POKE A,0
1800  PRINT "": REM   CTRL-G
1810  COLOR= 15: PLOT SX,SY
1820  HOME : PRINT "THIS DEFINITION STARTS ON THE WHITE DOT.
     "
1830  VTAB 24: INPUT "PRESS RETURN TO PLOT SHAPE ";A$
1840  REM
                    DRAW SHAPE
1850  HOME
1860  INPUT "SCALE = ";G$:G =  VAL (G$): IF G < 1 THEN 1860
1870  SCALE= G: INPUT "ROT = ";G$:G =  VAL (G$): ROT= G
1880  HOME : PRINT "G)REEN  P)URPLE  O)RANGE  B)LUE  W)HITE"
     : PRINT : INPUT "ENTER FIRST LETTER OF COLOR ";A$
1890  IF A$ <  > "G" AND A$ <  > "W" AND A$ <  > "B" AND A$
     <  > "P" AND A$ <  > "O" THEN 1880
1900  REM  POKE THE DIRECTORY
1910  POKE SS,SN: POKE SS + 1,0
1920 X = SS + 1
1930  FOR I = 1 TO SC
1940 B = SD(I) - SS
1950 X = X + 1:TA =  INT (B / 256)
1960  POKE X,B - TA * 256
1970 X = X + 1: POKE X,TA
1980  NEXT I
1990  REM
                    EDIT THE SHAPE
2000  IF A$ = "W" THEN  HCOLOR= 3
2010  IF A$ = "G" THEN  HCOLOR= 1
```

continued on next page

7. What can be on level three that can help you to the top of the hill in a hurry?

in

As a little soldier in CANNONBALL BLITZ you've run your legs off to scurry up two screens full of uphill battle. What leg saving device will you find on the third screen to get you up the hill in a hurry?
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8. How many times can a monster be reincarnated?

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The Shape (Cont.)

```
2020  IF A$ = "P" THEN  HCOLOR= 2
2030  IF A$ = "O" THEN  HCOLOR= 5
2040  IF A$ = "B" THEN  HCOLOR= 6
2050  HGR2 : DRAW SC AT 140,40
2060  INPUT A$: POKE  - 16298,0: POKE  - 16300,0: POKE  - 16
      301,0
2070 SD(SC + 1) = A + 1
2080  IF TM = 0 THEN  COLOR= 1: PLOT BX,BY
2090  HOME
2100  INPUT "DRAW THIS SHAPE AGAIN (Y/N) ";A$: IF A$ = "" TH
      EN 2090
2110  IF A$ = "Y" THEN 1850
2120  HOME
2130  INPUT "EDIT THIS SHAPE  (Y/N) ";A$: IF A$ = "" THEN 21
      30
2140  IF A$ = "Y" AND TM = 1 THEN 2620
2150  IF A$ = "Y" THEN 450
2160  IF TM = 1 THEN 2200
2170  HOME : INPUT "USE THIS SHAPE AS A BASE FOR ANOTHER
      (Y/N)";A$
2180  IF A$ = "Y" AND SC < SN THEN SC = SC + 1: GOTO 450
2190  REM
                    NEXT SHAPE
2200  NEXT SC
2210  REM
                    TABLE DATA
2220  TEXT
2230  HOME : PRINT "          SHAPE TABLE DATA"
2240  PRINT : PRINT : PRINT "SHAPE TABLE STARTS AT ";SS
2250  PRINT : PRINT "AND ENDS AT ";SD(SC)
2260  PRINT : PRINT "TABLE LENGTH IS ";SD(SC) - SS + 1
2270  REM  SHAPE LOCATION
2280  PRINT : PRINT "SAVE SHAPE WITH THIS COMMAND -"
2290  PRINT
2300  PRINT "BSAVE ";: INVERSE : PRINT "FILE NAME";: NORMAL
      : PRINT ",A ";SS;",L ";SD(SC) - SS + 1
2310  END
2320  REM
                    PLOT & ERASE SUBS
2330  POKE 33,40: HOME :
2340  PRINT  TAB( 33)"PLOT": POKE 33,30
2350  COLOR= 1
2360  HOME : GOTO 480
2370  POKE 33,40: HOME
2380  PRINT  TAB( 33)"ERASE": POKE 33,30
2390  COLOR= 0
2400  HOME : GOTO 480
2410  REM
                    CENTER SUB
2420  HTAB 21 -  LEN (A$) / 2: PRINT A$: RETURN
2430  REM
                    POKE CALCS
2440  VTAB 19: PRINT "START HEX NUMBERS WITH A '$'"
2450  VTAB 17: INPUT "WHERE WILL YOU PUT THE TABLE ";X$
2460 Y =  VAL (X$)
2470  IF  LEFT$ (X$,1) = "$" THEN X$ =  RIGHT$ (X$, LEN (X$)
      - 1): GOSUB 2540
2480 X = Y -  INT (Y / 256) * 256:Z =  INT (Y / 256)
2490  HOME : PRINT "USE THESE POKES IN YOUR PROGRAM BEFORE
      YOU DRAW YOUR FIRST SHAPE"
2500  PRINT : PRINT "POKE 232,";X: PRINT "POKE 233,";Z
2510  PRINT
2520  END
2530  REM
                    HEX CONVERTER
2540 Y = 0:Z = 0
2550  FOR I =  LEN (X$) - 1 TO 0 STEP  - 1
2560 Z = Z + 1
2570 Y1 =  ASC ( MID$ (X$,Z,1)) - 48
2580  IF Y1 > 16 THEN Y1 = Y1 - 7
2590 Y = Y + Y1 * 16 ^ I
2600  NEXT
2610  RETURN
2620  REM
                    TURTLE MODE
2630  GR : POKE 34,20: HOME : PRINT "MOVE DOT TO START & PRE
      SS 'P'": POKE 34,21
2640 Z = 1:X = 20:Y = X:XX = Y:YY = Y:TM = 1
2650  COLOR= 0: PLOT XX,YY: COLOR= 15: PLOT X,Y:XX = X:YY =
      Y: HOME : PRINT "X=";X;" Y=";Y: GET A$
2660  IF A$ = "P" THEN SX = X:SY = Y: GOTO 2720
2670  IF A$ = "I" AND Y > 0 THEN Y = Y - 1
2680  IF A$ = "M" AND Y < 39 THEN Y = Y + 1
2690  IF A$ = "K" AND X < 39 THEN X = X + 1
2700  IF A$ = "J" AND X > 0 THEN X = X - 1
2710  GOTO 2650
2720 P = 1:ZC = 0: POKE 34,20
2730 XX = X:YY = Y: HOME : PRINT "X=";X;" Y=";Y
2740  IF P = 1 THEN  PRINT "PLOT ON": GOTO 2760
2750  PRINT "PLOT OFF"
2760  GET A$
```

continued on next page

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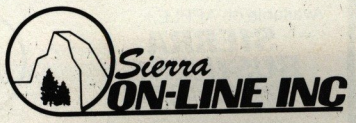

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10. Which top Apple originator recommends

LISA 2.5

His friend Steven Jobs helped him develop the Apple II and LISA 2.5 helps him develop machine language programs for it.
LISA does the same for other top programmers including graphics wizard Mark Pelczarski, Hi-Res adventure author Ken Williams and arcade author Olaf Lubeck. LISA is an assembler in use by people that use them everyday. Take a look at LISA 2.5. We think you'll agree with the Apple inventor(—)? (we won't give you the name). LISA is available at your local computer store for $79.95 or order directly from SIERRA ON-LINE.

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SPANISH LANGUAGE REVIEW

The Shape (Cont.)

```
2770  IF A$ = "M" AND Y < 39 THEN G(Z) = 2:Z = Z + 1:F = 0:Y
      = Y + 1: GOTO 2870
2780  IF A$ = "J" AND X > 0 THEN G(Z) = 3:Z = Z + 1:F = 0:X
      = X - 1: GOTO 2870
2790  IF A$ = "K" AND X < 39 THEN G(Z) = 1:Z = Z + 1:F = 0:X
      = X + 1: GOTO 2870
2800  IF A$ = "I" AND Y > 0 AND (F = 0 OR P = 1) THEN G(Z) =
      0:F = 1:Z = Z + 1:Y = Y - 1: GOTO 2870
2810  IF A$ = "?" THEN 3110
2820  IF A$ = "E" THEN P = 0: GOTO 2730
2830  IF A$ = "P" THEN P = 1: GOTO 2730
2840  IF A$ = "Q" THEN G(Z) = 10: COLOR= ZC: PLOT X,Y: GOTO
      1650
2850  IF A$ =  CHR$ (27) THEN 2900: REM  ESC KEY
2860  GOTO 2730
2870 CZ =  SCRN( X,Y): COLOR= ZC: PLOT XX,YY: COLOR= 15: PLO
     T X,Y:ZC = CZ
2880  IF P = 1 THEN G(Z - 1) = G(Z - 1) + 4: COLOR= 1: PLOT
      XX,YY
2890  GOTO 2730
2900  IF Z > 0 THEN Z = Z - 1
2910  IF Z <  = 0 THEN 2730
2920  ON G(Z) + 1 GOSUB 2940,2950,2960,2970,2940,2950,2960,2
      970
2930  COLOR= 15: PLOT X,Y: COLOR= 0: PLOT XX,YY: GOTO 2730
2940 Y = Y + 1: RETURN
2950 X = X - 1: RETURN
2960 Y = Y - 1: RETURN
2970 X = X + 1: RETURN
2980  REM
                    LINE MODE HELP
2990  POKE 33,40: HOME
3000  PRINT "V->  DRAW VERTICAL LINES": PRINT "H->  DRAW HOR
      IZONTAL LINES": PRINT "F->  ENTER FREE CURSOR MODE": INPUT "
      PRESS RETURN";A$: HOME
3010  PRINT "DRAW LINES BY GIVING THE ENDPOINTS AND": PRINT
      "LEVEL TO DRAW ON": INPUT "PRESS RETURN";A$: HOME
3020  PRINT "P-> TURNS PLOT ON (DRAW LINES)": PRINT "E-> TUR
      NS PLOT OFF (ERASE LINES)": INPUT "PRESS RETURN ";A$: HOME
3030  PRINT "Q->  QUIT DRAWING AND CODE THE SHAPE": INPUT "P
      RESS RETURN";A$: HOME : GOTO 2330
3040  REM
                    FREE CUR HELP
3050  HOME
3060  PRINT "I,J,K,M KEYS MOVE THE CURSOR": PRINT "P->  PLOT
      A POINT": PRINT "E->  ERASE A POINT": INPUT "PRESS RETURN";
      A$
3070  HOME
3080  PRINT "P & E ONLY EFFECT THE POINT THE CURSOR ": PRINT
      "IS RESTING ON,  NO OTHERS!": INPUT "PRESS RETURN";A$: HOME
3090  PRINT "Q->  RETURNS YOU TO THE HLIN MODE WITH": PRINT
      "THE PLOT ON": INPUT "PRESS RETURN";A$: HOME
3100  GOTO 1000
3110  REM
                    TURTLE MODE HELP
3120  HOME : PRINT "I,J,K,M KEYS MOVE THE CURSOR": PRINT "P-
      >  TURN PLOTTING ON": PRINT "E->  TURN PLOTTING OFF": INPUT
      "PRESS RETURN";A$: HOME
3130  PRINT "THE ESC KEY WILL ALLOW YOU TO 'BACK UP'": PRINT
      "AND ERASE ERRORS": INPUT "PRESS RETURN";A$: HOME
3140  PRINT "Q->  QUIT DRAWING AND CODE THE SHAPE": INPUT "P
      RESS RETURN";A$: HOME : GOTO 2730
```


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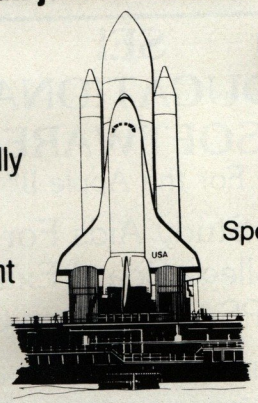

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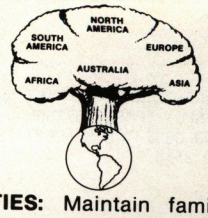

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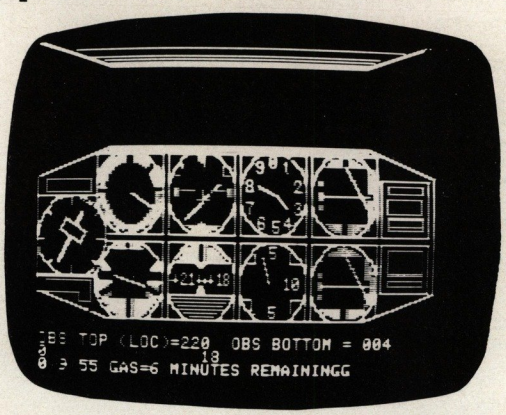

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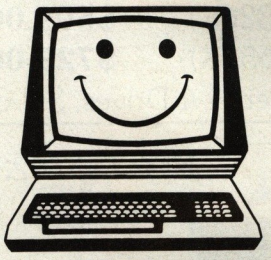

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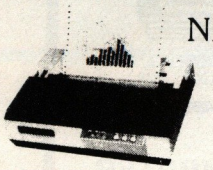

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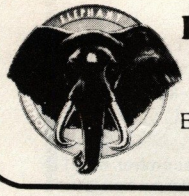

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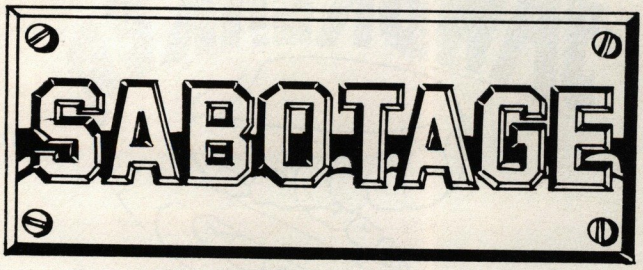

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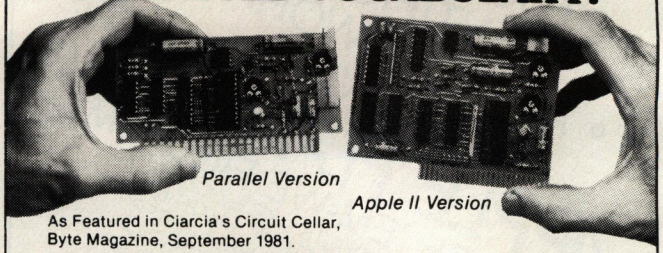

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Applesoft Auto-Number

by Grant Stevens
11483 Sanford
Detroit, MI 48205

Does typing line numbers slow you down as you type in an Applesoft program? Do your fingers wander to the wrong digit keys, or worse yet, do you press two keys at once? Do you forget what line number comes next? In short, do you wish Applesoft had an auto-numbering feature?

Well, here it is! This routine not only numbers your Applesoft programs, but also allows you to insert a carriage return in an input line, and sounds a bell to warn you that your line is too long. Best of all, it fits nicely into the area above hex **$0300**.

INITIALIZING AUTO-NUMBER

To initialize Auto-Number from **disk**, simply **BRUN** it.

To initialize Auto-Number from **cassette**, type from the monitor **2FA.3CFR 2FAG** and start the tape.

Once Auto-Number is initialized, the Apple's speaker will sound a **"click"** each time a key is pressed. This audible signal has two advantages: First, you know at once if Auto-Number becomes disconnected (the speaker will stop clicking), and second, if a key doesn't work properly you will hear the error even if you can't see it.

If Auto-Number becomes disconnected (perhaps by a RESET or disk LOAD), it can always be **reinitialized** by typing the familiar (to machine language dabblers) line **CALL 768**. **If, however, Auto-Number is connected or partially connected and you type CALL 768, Auto-Number will enter a closed loop.** The cursor may disappear, and the Apple will not respond to the keyboard. **To recover, simply press RESET, and then reinitialize Auto-Number by typing CALL 768.**

USING THE CTRL-Q TOGGLE

When you initialize Auto-Number, all of its features will work except one: the auto-number feature.

The auto-number feature can be turned **"on"** or **"off"** at any time (without affecting the operation of Auto-Number's other features) by simply pressing **CTRL-Q**. This allows you to do more effective editing of Applesoft programs even when you don't want to use auto-numbering.

Pressing CTRL-Q will also terminate the input line (just as if you had pressed RETURN). It will not appear as a character in the input line or in any way interfere with normal input.

USING THE AUTO-NUMBER FEATURE

To use Auto-Number, first **initialize** as explained above, and **press CTRL-Q once**. Auto-number is now connected and ready.

Enter the line **100 REM** and press return. You will see the Applesoft prompt followed by **110** and the flashing cursor. Type PRINT, and you will see the prompt followed by **120** and the cursor. This is how Auto-Number works.

Now press backspace three times to bring the cursor to the beginning of the line. Enter the line **1000 FOR N=1 TO 10**. The prompt will show **1010**. Type **PRINT TAB(N)N**, and the prompt will show **1020**. Type **NEXT N**, and the prompt will show **1030**.

Now backspace four times (or press CTRL-X) and type LIST. The program lists, and **no line number appears with the cursor**. Type RUN. The program runs, and again no line number appears. You may enter as many immediate execution commands as you wish in this manner.

To begin auto-numbering again, simply enter a line beginning with a digit.

The auto-number program follows two simple rules:

1. **If the first character of an entered line is a digit, then at the next prompt Auto-Number displays a number ten higher than the number of the entered line.**
2. **If the first character of an input line is not a digit, then no line number is issued with the next prompt.**

What this means is that an immediate execution command is followed by a BASIC prompt as usual, but a program line is followed by a BASIC prompt and a line number ten higher than that of the line just entered.

Want to enter a single line without activating Auto-Number? No problem . . . just **begin the line with a space** followed by the line number and the line. Auto-Number will detect the first character — the space — as a non-digit character and follow rule two above.

USING THE INSERT C/R FEATURE

To demonstrate the insert **c/r** feature, first press **CTRL-Q** until the auto-number feature is **"off"**. (This is just a convenience — it will work with auto-number "on" or "off".)

Type **NEW** and enter the following line, pressing CTRL-J where indicated. Press RETURN only once, after the second quotation mark.

```
10 PRINT "FIRST LINE (CTRL-J)
SECOND LINE (CTRL-J)
THIRD LINE" (RETURN)
```

When you press **CTRL-J**, the cursor moves to the left side of the next line, and a carriage return character is placed in the input line.

Now type "LIST". The listing will be on three lines, just like the entered line.

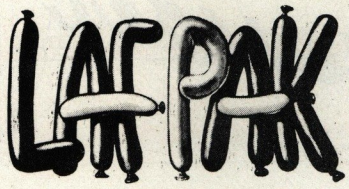
Now type "RUN". The output will also be on three lines.

The capability of inserting carriage returns in program lines is a tremendous advantage for readability and efficiency. For example, it can be used to visually separate main program portions or subroutines. I usually begin my subroutines with lines like

```
50110 REM
*******************
GET A Y/N KEYSTROKE
50111 GET K$: . . .
```

continued on next page

15. What shocking and terrible sound could you possibly hear in a game called



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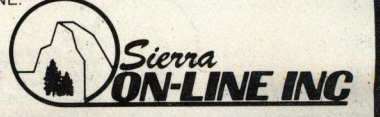

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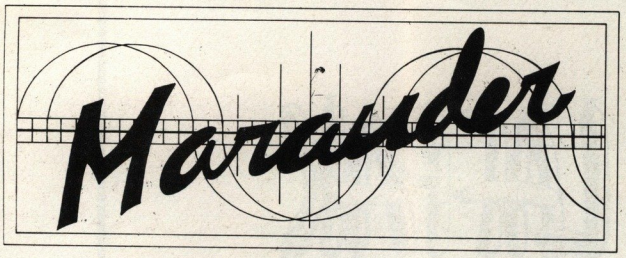
16. How many men are in the spaceships of



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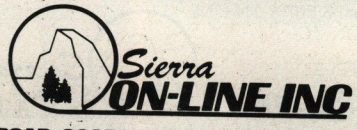

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Applesoft Auto-Number (Cont.)

This stands out well in a listing while consuming only one program line.

Another application to which the insert c/r feature lends itself is in lines such as

```
200 PRINT "YOU MAY SELECT FROM THE
FOLLOWING —

   (P)  PRINT DATA
   (A)  ADD RECORDS
   (C)  CHANGE RECORDS
   (D)  DELETE RECORDS
   (V)  VIEW RECORDS
   (Q)  QUIT

SELECT: ";
```

I find this more readable than the equivalent using ten PRINT statements.

The inserted carriage return looks like any other character to Applesoft. You can backspace over it (but you can't foreward arrow over it without it being erased), and you can insert it in string literals to be manipulated in any way that other strings are manipulated.

THE WARNING BELL FEATURE

In Applesoft, it is possible to enter input lines up to **255** characters in length. The 256th character entered will cause the entire line to be cancelled, and the input routine will begin again. **For every character after the 248th, a bell character is issued when the character is entered.**

But when a line is complete, Applesoft examines its length. If it has more than 239 characters, **Applesoft truncates it to 239 characters**. Since the warning bell doesn't sound until the 249th character, any lines from 240 to 248 characters in length will be truncated without a warning bell.

The auto-number program sounds a bell with every character entry from the 235th to the 239th — the last five characters accepted by Applesoft. Characters from the 240th to the 248th will not be accompanied by the warning bell, which resumes with the 249th character as usual.

In this way the user is made immediately aware if his line will be truncated. Any characters (other than the RETURN key) entered after the fifth warning bell will be truncated. You don't have to count bells — the truncated characters can be recognized by the absence of a bell upon their entry.

ENTERING THE AUTO-NUMBER PROGRAM

To get the Auto-Number program into your Apple, first enter the monitor by typing CALL-151. Then enter the data shown as listing #1 (see the machine language loading instructions in the Letters section of this issue). If you are the meticulous type (or if Auto-Number fails to work properly), you can list the program by typing **"2FA.3CF"** and compare the listing with listing #1. In any case, **you should verify the line beginning with $02FA immediately before saving the program, since this line is located in the input buffer area and is therefore vulnerable to being over-written by long input lines.**

To save Auto-Number on cassette tape, start the tape on "record" and enter the line **2FA.3CFW**.

To save Auto-Number on disk, simply type **BSAVE AUTO-NUMBER,A$2FA,L$D6**.

POSSIBLE MODIFICATIONS

I suggest two modifications that can be made to Auto-Number easily if you want them.

The first modification is a **change in the increment** by which new line numbers are calculated by Auto-Number. This is stored as a **two-byte quantity** with the **low byte at $034A** (decimal **842**) and the **high byte at $034F** (decimal **847**). **Normally $034A** contains **$0A** (decimal 10) and **$034F** contains **$00**.

If you want to increment by, say, **five**, simply **"POKE 842,5"**. To increment by **100**, **"POKE 842,100"**. To increment by **1000**, you must change both the high and low bytes of the increment. Since **1000 = 3 * 256 + 232**, the change would be **"POKE 847,3:POKE 842,232"**.

The second modification is to have the auto-number feature in the **"on"** position when Auto-Number is initialized. Location **$03C9** (decimal 969) contains the low byte of the address of label **LINE NUMBER** (**$46**, decimal 70) or label **BEGIN** (**$70**, decimal 112), whichever is to be executed when a BASIC prompt is issued for a new line. To make the change, simply **"POKE 969,70"** and save the modified version.

TWO CAUTIONS

Auto-Number can't tell whether the line which is being input is for Applesoft, the monitor, a user program, or any other source. It also can't tell whether input is coming from the keyboard or from a disk file or other source. No matter what source is calling for an input line, Auto-Number will work faithfully (but not always as expected). This fact can have undesirable results if, for example, a BASIC program's input is being auto-numbered.

So before you RUN a program, or enter the monitor, or perform anything in which you don't want your input to be tampered with, press **CTRL-Q** to toggle the auto-number feature "off". Or better yet, press **RESET**. This will disconnect Auto-Number entirely. You can re-connect it later by typing CALL 768.

Another thing to watch for: Auto-Number can't tell whether or not the keyboard is in "ESCape" mode, and it treats every keypress the same regardless of mode. BASIC, of course, gives every key a different function while in "ESCape" mode.

So it is best to avoid pressing CTRL-Q, CTRL-J or RETURN after pressing the ESC key. If you should happen to press one of these keys while in "escape" mode, though, probably the worst that will happen is that the input line may be altered.

HOW AUTO-NUMBER WORKS

Auto-Number's job is to "listen" as you type in a BASIC program, and to do specific things depending on what it "hears". It listens for each condition mentioned earlier — a **CTRL-J** keystroke, a **CTRL-Q** keystroke, the **235th through 239th characters** (for the warning bell), and a **new line** (for auto-numbering) — and when it detects one of these conditions, it performs the job connected with that condition.

How can we write a program which will **monitor every keystroke** as a BASIC program is entered? Fortunately, Apple makes it possible for machine language programmers.

continued on next page

17. What winged defense system emits a deathbolt of fire in

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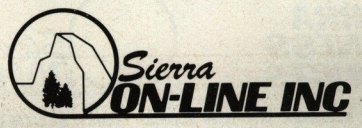

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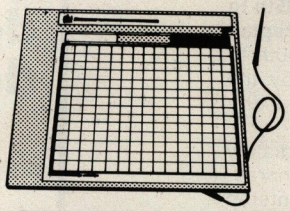

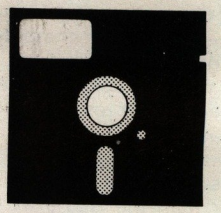

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Applesoft Auto-Number (Cont.)

Every time the Apple needs a keystroke, it puts a flashing cursor on the screen and then executes an **indirect jump to the address stored in zero-page locations $38 and $39**. The addressed machine language program is expected to get a keystroke (from the keyboard or whatever other source it chooses), restore the flashing cursor to its former character (which is stored in the accumulator), load the ASCII value of the keystroke into the accumulator, and execute an RTS.

Upon **power-up**, the Apple places the address **$FD1B** in locations **$38** and **$39**. This causes keystroke requests thereafter to jump to **$FD1B**. The monitor routine at this address waits for a keypress, and then stores the accumulator value (which is the screen character replaced by the flashing cursor) into the screen cursor position. It then loads the ASCII value of the keypress into the accumulator, and executes an RTS. (If DOS is booted, it puts a different value into $38 and $39.)

If we can put the address of a routine we write into $38 and $39, then our routine will be called each time a keypress is requested. Our routine can then get a keystroke, inspect it, and manipulate it at will. This is exactly what Auto-Number does.

HOW IT WORKS — THE KEYIN/COUT INTERCEPTOR

Listing #2 shows a program I call **KEYIN/COUT INTERCEPTOR**, which is also the first part of Auto-Number (although in Auto-Number it is modified for space efficiency). When label **INITIALIZE** is executed, it saves the contents of **$36, $37, $38** and **$39** for future reference and then puts the addresses of label **KEYIN INTERCEPT** and **COUT INTERCEPT** into **$36** through **$39**. Thereafter, every keystroke request executes its indirect jump to label KEYIN INTERCEPT. Output from the Apple is handled in a manner similar to input requests, so the KEYIN/COUT INTERCEPTOR causes printed output to jump to label COUT INTERCEPT.

Label KEYIN INTERCEPT contains only a jump to label KEYIN JUMP, and label COUT INTERCEPT contains only a jump to label COUT JUMP. KEYIN JUMP and COUT JUMP are the channels through which input requests and outputs can be sent by KEYIN/COUT INTERCEPTOR. Each one executes label **RESET**, which **restores $36 through $39** to their pre-initialization values. It then executes a JSR to one of the addresses stored in **$36** through **$39** (**$36 & $37 for output, $38 & $39 for input**). Finally, it re-executes label INITIALIZE, so that the next input request or output will be intercepted.

Now what benefit is there in a program which intercepts all input and output but sends it through the usual channels? From a user's standpoint the INTERCEPTOR would be invisible.

The benefit is that by changing the operands of labels KEYIN INTERCEPT and/or COUT INTERCEPT, we can send the intercepted data to a program which will do with the data whatever we require.

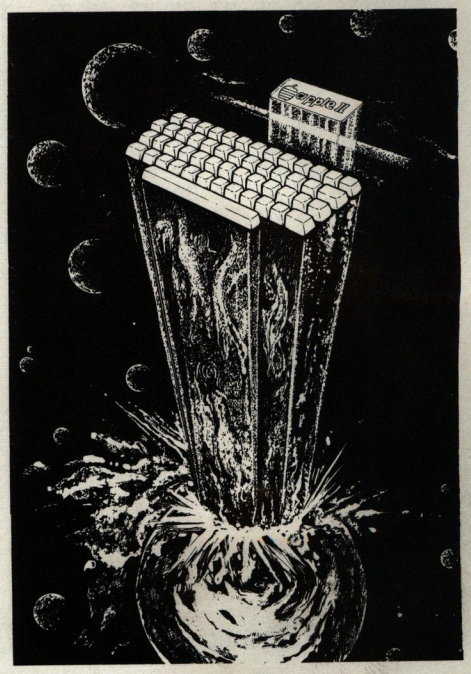
Suppose, for example, that we want to LIST a BASIC program, and that we want the listing to be double-spaced. The Apple has no built-in means of double-spacing output, but **if we can monitor the output, we can send an extra carriage return** every time we detect a carriage return in the output. The following program segment, appended to KEYIN/COUT INTERCEPTOR, will do the job:

```
034C:4C  3A  03   KEYIN INTERCEPT   JMP KEYIN JUMP;INPUT AS
                                                  ;USUAL
034F:4C  52  03   COUT INTERCEPT    JMP DOUBLE SPACE
0352:C9  8D       DOUBLE SPACE      CMP #$8D;A CARRIAGE RETURN?
0354:D0  03                         BNE SEND AS USUAL;NO, SO
                                                  ;SEND JUST ONE
0356:20  46  03                     JSR COUT JUMP;YES, SO SEND
                                                  ;AN EXTRA ONE
0359:4C  46  03   SEND AS USUAL     JMP COUT JUMP
```

Incidentally, why should we bother to intercept both input and output if we intend to monitor only input, as in the case of Auto-Number? The reason is that **DOS manipulates both the input and output registers ($36 through $39) during both input and output. That is, during output, DOS can disconnect the KEYIN INTERCEPTOR.** By monitoring output, we **execute labels RESET and INITIALIZE, and thereby prevent DOS from disconnecting the INTERCEPTOR.**

The rest of Auto-Number (an assembler listing appears as **listing #3**) is more straightforward and probably easier to disect than the KEYIN/COUT INTERCEPTOR. I have gone into this detail with the INTERCEPTOR because it makes a good base for "patching" into the Apple's ROM via input and/or output, and I hope many of you find it useful for other utilities.

continued on next page



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Applesoft Auto-Number (Cont.)

```
02FA:20 00 03 4C 03 E0
0300:48 A5 36 8D 3E 03 A5 37
0308:8D 3F 03 A5 38 8D 74 03
0310:A5 39 8D 75 03 A9 3A 85
0318:36 A9 43 85 38 A9 03 85
0320:37 D0 13 48 AD 3E 03 85
0328:36 AD 3F 03 85 37 AD 74
0330:03 85 38 AD 75 03 85 39
0338:68 60 20 23 03 20 00 00
0340:4C 00 03 4C 70 03 A5 50
0348:18 69 0A AA A5 51 69 00
0350:20 24 ED A5 24 85 91 A0
0358:01 84 24 A9 62 8D 44 03
0360:B1 28 C6 91 F0 03 91 28
0368:60 48 A9 70 8D 44 03 68
0370:20 23 03 20 00 00 20 00
0378:03 48 2C 30 C0 A9 20 20
0380:A8 FC 2C 30 C0 E0 EA 90
0388:07 E0 EF B0 03 20 3A FF
0390:68 C9 91 D0 0A AD C9 03
0398:49 36 8D C9 03 D0 1D C9
03A0:8A D0 15 20 8B FD 9D 00
03A8:02 E0 F8 90 03 20 3A FF
03B0:A9 98 E8 F0 1A 4C 0C FD
03B8:C9 8D D0 13 8A F0 0E AD
03C0:00 02 49 B0 C9 0A B0 05
03C8:A9 70 8D 44 03 A9 8D 60
```

Listing #1. Monitor listing of Auto-number.

```
0300:48          INITIALIZE   PHA
0301:A5 36                    LDA $36
0303:8D 47 03                 STA COUT JUMP+4
0306:A5 37                    LDA $37
0308:8D 48 03                 STA COUT JUMP+5
030B:A5 38                    LDA $38
030D:8D 3E 03                 STA KEYIN JUMP+4
0310:A5 39                    LDA $39
0312:8D 3F 03                 STA KEYIN JUMP+5
0315:A9 4F                    LDA #COUT INTERCEPT
0317:85 36                    STA $36
0319:A9 4C                    LDA #KEYIN INTERCEPT
031B:85 38                    STA $38
031D:A9 03                    LDA #COUT INTERCEPT/256:ALSO EQUALS
031F:85 37                    STA $37                 :KEYIN INTERCEPT/256
0321:D0 13                    BNE STA39:FORCED BRANCH
0323:48          RESET        PHA
0324:AD 47 03                 LDA COUT JUMP+4
0327:85 36                    STA $36
0329:AD 48 03                 LDA COUT JUMP+5
032C:85 37                    STA $37
032E:AD 3E 03                 LDA KEYIN JUMP+4
0331:85 38                    STA $38
0333:AD 3F 03                 LDA KEYIN JUMP+5
0336:85 39       STA39        STA $39
0338:68                       PLA
0339:60                       RTS
033A:20 23 03    KEYIN JUMP   JSR RESET
033D:20 00 00                 JSR $0000:FORMER CONTENTS OF $38 & $39 GO HERE
0340:4C 00 03                 JMP INITIALIZE
0343:20 23 03    COUT JUMP    JSR RESET
0346:20 00 00                 JSR $0000:FORMER CONTENTS OF $36 & $37 GO HERE
0349:4C 00 03                 JMP INITIALIZE
034C:4C 3A 03    KEYIN INTERCEPT  JMP KEYIN JUMP
034F:4C 43 03    COUT INTERCEPT   JMP COUT JUMP
```

Listing #2. Assembler listing of KEYIN/COUT INTERCEPT.

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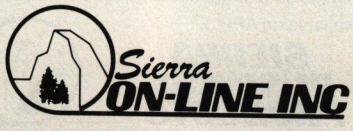

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```
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02FD:4C 03 E0                  JMP $E003;RE-ENTER BASIC

0300:48          INITIALIZE    PHA
0301:A5 36                     LDA $36
0303:8D 3E 03                  STA COUT JUMP+4
0306:A5 37                     LDA $37
0308:8D 3F 03                  STA COUT JUMP+5
030B:A5 38                     LDA $38
030D:8D 74 03                  STA KEYIN JUMP+4
0310:A5 39                     LDA $39
0312:8D 75 03                  STA KEYIN JUMP+5
0315:A9 3A                     LDA #COUT JUMP
0317:85 36                     STA $36
0319:A9 43                     LDA #KEYIN INTERCEPT
031B:85 38                     STA $38
031D:A9 03                     LDA #COUT INTERCEPT/256;ALSO EQUALS
031F:85 37                     STA $37                 ;KEYIN INTERCEPT/256
0321:D0 13                     BNE STA39;FORCED BRANCH

0323:48          RESET         PHA
0324:AD 3E 03                  LDA COUT JUMP+4
0327:85 36                     STA $36
0329:AD 3F 03                  LDA COUT JUMP+5
032C:85 37                     STA $37
032E:AD 74 03                  LDA KEYIN JUMP+4
0331:85 38                     STA $38
0333:AD 75 03                  LDA KEYIN JUMP+5
0336:85 39       STA39         STA $39
0338:68                        PLA
0339:60                        RTS

033A:20 23 03    COUT JUMP     JSR RESET
                 COUT INTERCEPT EQU COUT JUMP
033D:20 00 00                  JSR $0000
0340:4C 00 03                  JMP INITIALIZE
0343:4C 70 03    KEYIN INTERCEPT JMP BEGIN

                 ;PRINT NEW LINE NUMBER, THEN FOREWARD ARROW OVER IT

0346:A5 50       LINE NUMBER   LDA $50
0348:18                        CLC
```

continued on next page

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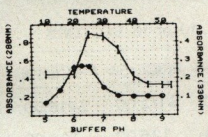

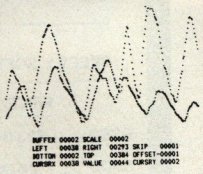

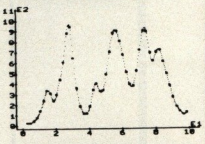

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Applesoft Auto-Number (Cont.)

```
0349:69 0A                      ADC #$0A ;ADD 10 TO LINE NUMBER LO BYTE
034B:AA                         TAX
034C:A5 51                      LDA $51
034E:69 00                      ADC #$00 ;ADD CARRY TO HI BYTE
0350:20 24 ED                   JSR $ED24;PRINT NEW LINE NUMBER
0353:A5 24                      LDA $24
0355:85 91                      STA $91  ;SAVE NO. OF DIGITS+1 IN LINE NUMBER
0357:A0 01                      LDY #$01 ;SET CURSOR TO FIRST DIGIT
0359:84 24                      STY $24
035B:A9 62                      LDA #FWD ARROW     ;SEND NEXT KEYPRESS REQUESTS
035D:8D 44 03                   STA KEYIN INTERCEPT+1;TO LABEL FWD ARROW
0360:B1 28                      LDA ($28),Y

0362:C6 91      FWD ARROW       DEC $91
0364:F0 03                      BEQ BEGIN AGAIN
0366:91 28                      STA ($28),Y
0368:60                         RTS

0369:48         BEGIN AGAIN     PHA
036A:A9 70                      LDA #BEGIN         ;SEND NEXT KEYPRESS REQUESTS
036C:8D 44 03                   STA KEYIN INTERCEPT+1;TO LABEL BEGIN
036F:68                         PLA

                ;EVERY KEYSTROKE REQUEST BEGINS HERE . . .
                ;(EXCEPT WHILE ISSUING A LINE NUMBER)

0370:20 23 03   BEGIN           JSR RESET
                KEYIN JUMP      EQU BEGIN
0373:20 00 00                   JSR $0000
0376:20 00 03                   JSR INITIALIZE
0379:48                         PHA
037A:2C 30 C0                   BIT $C030;CLICK SPEAKER
037D:A9 20                      LDA #$20
037F:20 A8 FC                   JSR $FCA8;WAIT .003 SECONDS
0382:2C 30 C0                   BIT $C030;"UN-CLICK" SPEAKER
0385:E0 EA                      CPX #$EA ;(=234)
0387:90 07                      BCC NO BELL 1
0389:E0 EF                      CPX #$EF ;(=239)
038B:B0 03                      BCS NO BELL 1
038D:20 3A FF                   JSR $FF3A;SOUND BELL IF 234<=LINE LENGTH<239
0390:68         NO BELL 1       PLA
```

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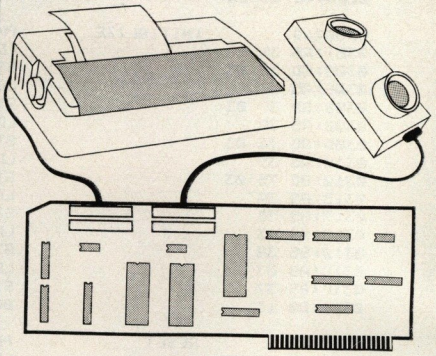

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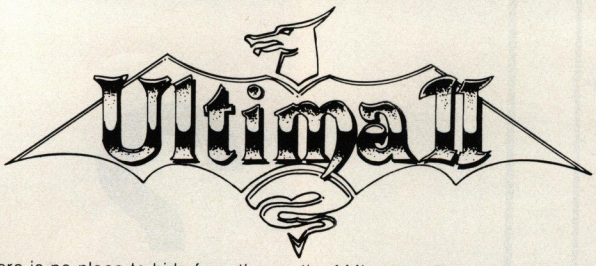

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Applesoft Auto-Number (Cont.)

```
0391:C9 91                    CMP #$91 ;CTRL-Q?
0393:D0 0A                    BNE NOT CTRL Q

                ;DO THIS IF CTRL-Q IS PRESSED . . .

0395:AD C9 03                 LDA AUTONUMBER+1
0398:49 36                    EOR #$36 ;LINE NUMBER XOR BEGIN
039A:8D C9 03                 STA AUTONUMBER+1
039D:D0 1D                    BNE END OF LINE;FORCED BRANCH
039F:C9 8A      NOT CTRL Q    CMP #$8A ;CTRL-J?
03A1:D0 15                    BNE NOT CTRL J

                ;DO THIS IF CTRL-J IS PRESSED . . .

03A3:20 8B FD                 JSR $FD8B;SEND C/R TO SCREEN
03A6:9D 00 02                 STA $0200,X;PUT C/R IN INPUT LINE
03A9:E0 F8                    CPX #$F8 ;(=248)
03AB:90 03                    BCC NO BELL 2
03AD:20 3A FF                 JSR $FF3A;SOUND BELL IF LINE LENGTH>248
03B0:A9 98      NO BELL 2     LDA #$98 ;CTRL-X
03B2:E8                       INX      ;INCREMENT LINE LENGTH
03B3:F0 1A                    BEQ RTS  ;CANCEL IF 256TH CHAR
03B5:4C 0C FD                 JMP $FD0C;OTHERWISE GET NEXT KEYPRESS
03B8:C9 8D      NOT CTRL J    CMP #$8D ;C/R?
03BA:D0 13                    BNE RTS

                ;DO THIS IF C/R IS PRESSED . . .

03BC:8A         END OF LINE   TXA
03BD:F0 0E                    BEQ SEND CR;LINE LENGTH=0 SO DON'T AUTO-NUMBER
03BF:AD 00 02                 LDA $0200
03C2:49 B0                    EOR #$B0
03C4:C9 0A                    CMP #$0A
03C6:B0 05                    BCS SEND CR;FIRST CHAR IS NON-DIGIT
                                         ;SO DON'T AUTO-NUMBER

                ;CONDITIONS ARE RIGHT FOR AUTO-NUMBERING, SO . . .

03C8:A9 70      AUTONUMBER    LDA #BEGIN;SEND NEXT KEYPRESS REQUEST TO LABEL
03CA:8D 44 03                 STA KEYIN INTERCEPT+1     ;BEGIN OR LINE NUMBER
03CD:A9 8D      SEND CR       LDA #$8D
03CF:60         RTS           RTS
```

Listing #3. Assembler listing of Auto-number.

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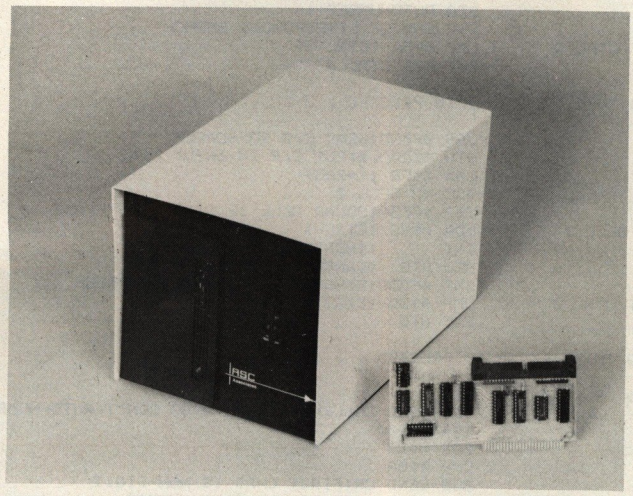

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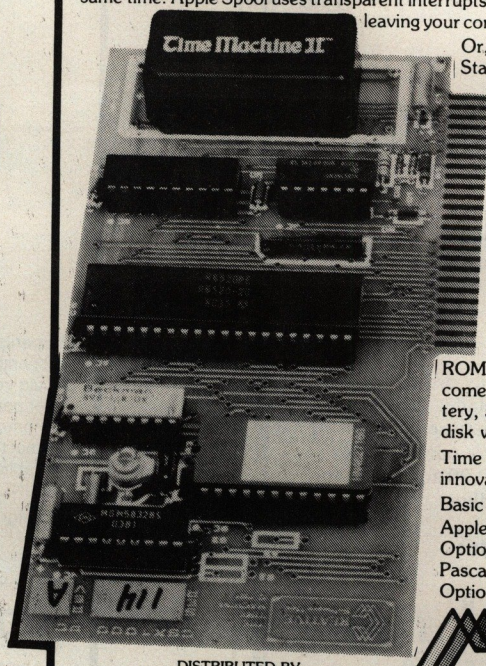

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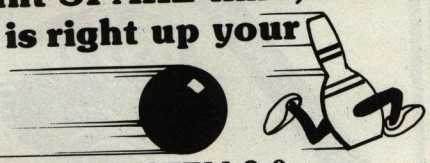

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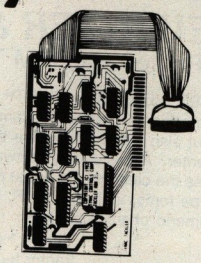

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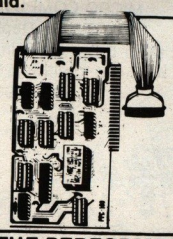

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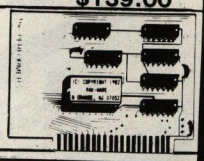

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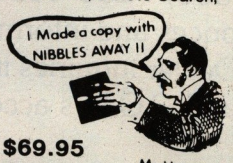

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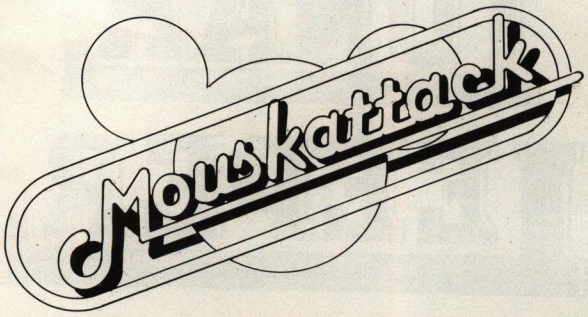
26. What two things do the mice in



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DISK MAP

by James O. Church
20 Placid St.
Trumbull, CT 06611

Sometimes it's nice to do a little extra with your Apple even though it doesn't serve a very useful purpose. It is useful to know how many free sectors there are left on your diskette, but there's a little frosting on the cake if you can have a picture of the tracks and see which ones are being used and which ones are free. I believe anything which increases one's understanding of the Apple is justification enough to do something like DISK MAP.

TRACK BIT MAPS

Boot up DOS with a freshly INITialized disk, enter the monitor with **CALL - 151** and type **B3F3.B47F<RTN>**. You will be looking at a memory dump of what are known as **Track Bit Maps**. Each track on the disk you booted is represented by **4 bytes. Track 0** is represented by the first 4 bytes you see, and what you see is **00 00 00 00**.

The first two bytes are used in these Track Bit Maps, and the second two bytes are unused. Whenever a bit is "on" (i.e., equal to 1) in a Track Bit Map it means there is an unused sector on the track. In the dump (list 1) accompanying this article you will observe that **Track 0, 1** and **2** are all zero bytes, meaning that there are **no empty sectors** on these three tracks. What's there? DOS.

Track 3, however, has FF FF 00 00 in the Track Bit Map for that track. That means that the bits look like this in the first two bytes. **11111111 11111111**. (We can disregard the second two bytes. They are always zero and not used.) The meaning of this is that all 16 sectors on track 3 are free.

If you find **track 17**, you will find it says 00 00 00 00, meaning it is used. That is because the disk directory is usually there.

COUNTING SECTORS

All we must do to count the sectors which are used, then, is count the number of bits in the 35 Track Bit Maps which are "off" (i.e., equal to 0), and we can ignore the second two bytes of each Track Bit Map.

My program not only counts the number of bits that are "off" in all the Track Bit Maps, but also puts the number of these bits found into a table for each track.

HOW IT WORKS

How does one count the bits which are "off" in a byte? The easiest way is to put the byte into the accumulator and shift it left with the **ASL** instruction. This puts the first bit into the **CARRY BIT** which can then be **tested** with the **BCS** test. If the CARRY BIT is set, it means that the sector is free and we don't count it. Obviously, its up to me to decide whether to count "on" bits or "off" bits. I arbitrarily decided to count off bits (or used sectors). I place the **result** of the count in the table for each track, and the total result **in location $08 and $09.** For each byte we must count all 8 bits.

THE GRAPHICS

The graphics part is relatively simple. I first put a dark color on the screen in 35 columns, representing the 35 tracks in 16 locations in each column. Then I have the program consult the table I made for each track and enter a light color in the column beginning at a point which shows graphically how many sectors are USED. Actually, the map may not be an accurate indication of **which sectors** on a track are free. It only provides a display of **how many sectors** of a track are free and how many are used. Generally speaking, if one sees a lot of light color, he knows that the disk is relatively empty.

I use the program as a HELLO program a lot and find it helpful when I wonder if there is room on the disk for saving something I am about to create. Instead of having to find the disk with the FREE SPACE program on it, I can RUN HELLO. For this reason, I turned the machine language into DATA statements (list 2) so it would always be there.

Alternatively, you may prefer to BLOAD Disk Map when you wish to use it. If you enter it at $4000 (list 3) and it is in machine language, you can probably BLOAD it and CALL it while you have an Applesoft program in memory. This would allow you to determine disk space without bombing your Apple program (unless your program uses the memory block beginning at location hex $4000).

LIST 2

```
1   REM ***************************
2   REM *  << DISK MAPPER >>      *
3   REM *  BY JAMES O. CHURCH     *
4   REM *  COPYRIGHT (C) 1982     *
5   REM *  BY MICRO-SPARC INC     *
6   REM *  LINCOLN, MA. 01773     *
7   REM *  ALL RIGHTS RESERVED    *
8   REM ***************************
70  HOME
80  VTAB 10: PRINT "PLEASE WAIT ONE
     MOMENT FOR DISK MAP"
90  PRINT  CHR$ (4);"VERIFY HELLO"
100  FOR I = 0 TO 299: READ A: POKE
     16384 + I,A: NEXT
110  CALL 16384
120 A =  PEEK (9) * 256 +  PEEK (8)
130  PRINT : PRINT "SECTORS FREE ";5
     60 - A;"      SECTORS USED ";A
140  PRINT "LIGHT COLOR AREA IS FREE
     ";
150  GET A$
160  TEXT : HOME
1000  DATA 169,243,133,6,169
1001  DATA 179,133,7,162,8
1002  DATA 160,0,140,214,64
1003  DATA 140,215,64,177,6
1004  DATA 10,176,3,238,214
1005  DATA 64,202,208,247,162
1006  DATA 8,200,177,6,10
1007  DATA 176,3,238,214,64
1008  DATA 202,208,247,174,215
1009  DATA 64,173,214,64,157
1010  DATA 216,64,238,215,64
1011  DATA 173,215,64,201,35
1012  DATA 240,23,24,165,6
1013  DATA 105,4,133,6,165
1014  DATA 7,105,0,133,7
1015  DATA 162,8,160,0,140
1016  DATA 214,64,76,18,64
1017  DATA 173,80,192,173,86
1018  DATA 192,173,83,192,32
1019  DATA 54,248,169,2,141
1020  DATA 213,64,169,0,141
1021  DATA 212,64,169,2,32
1022  DATA 100,248,173,212,64
1023  DATA 172,213,64,32,0
```

continued on next page

27. What is the secret password to begin

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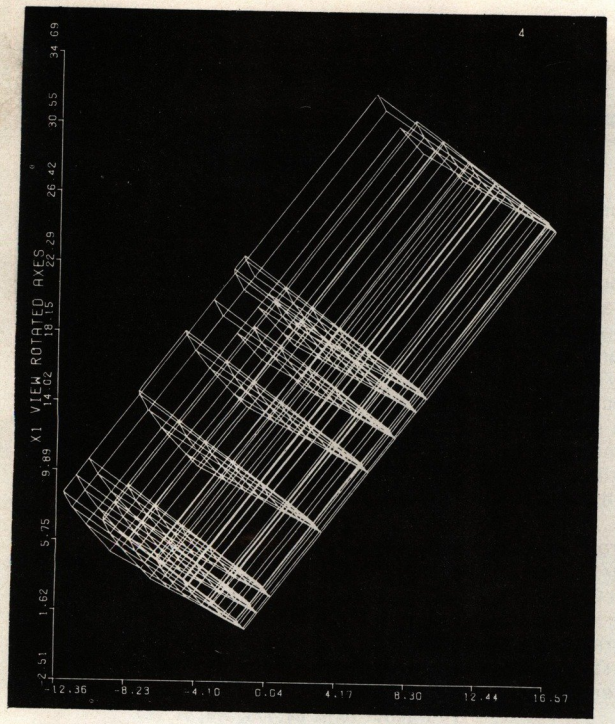

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28. What password is hidden on the restroom wall in the adult text adventure

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*NOTE: This game is R-Rated. It is not suggested for minors or persons easily offended. This question may be omitted from your answer sheet if the subject matter offends you.

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My program, **SUPER PHONE**, keeps a telephone directory of **PEOPLE** and **MODEMS** and dials them automatically.

When I call **PEOPLE** I can hear what they say, but when I call **MODEMS** I can see what they say, save what they say and print what they say. There is no limit to the amount of data I can receive, save and print.

When it comes to **MICROMODEM II's** attached to other **APPLES** I can take programs from their disks and put them on my disks. I can take programs from my disks and put them on their disks.

For example, **SUPER PHONE** is $D84 bytes long and is all machine language. I can call you and transfer **SUPER PHONE** to your **APPLE'S** disk. The actual transmission time is about 7 minutes.

If I had a **D.C. HAYES MICROMODEM II** and **APPLE-SOFT** and didn't have **SUPER PHONE**, I would certainly want it. It makes telecommunication very convenient, indeed.

My fee for installing **SUPER PHONE** on your **APPLE'S** disk is $40. Send me a check and your phone number. I'll give you a call. Just say, "Hello". **SUPER PHONE** takes care of getting our **APPLES** on the line.

I am only a one **APPLE** operation. I deliver these one at a time. You may have to wait, but if I don't deliver in three weeks, I'll return your uncashed check. Furthermore, if I deliver and you can't do all the things I am telling you about, I'll refund the fee and you can make a down payment on one of the expensive terminal programs that are on the market.

James O. Church
20 Placid Street
Trumbull, CT 06611

P.S. Don't call me. I'll call you.

Disk Map (Cont.)

```
1024  DATA 248,24,173,212,64
1025  DATA 105,1,141,212,64
1026  DATA 201,32,144,234,169
1027  DATA 0,141,212,64,24
1028  DATA 173,213,64,105,1
1029  DATA 141,213,64,201,37
1030  DATA 144,216,32,251,64
1031  DATA 169,20,133,37,32
1032  DATA 34,252,32,66,252
1033  DATA 169,2,133,36,169
1034  DATA 176,32,237,253,169
1035  DATA 19,133,36,169,196
1036  DATA 32,237,253,32,142
1037  DATA 253,169,0,133,8
1038  DATA 133,9,162,34,189
1039  DATA 216,64,24,101,8
1040  DATA 133,8,165,9,105
1041  DATA 0,133,9,202,16
1042  DATA 239,96,32,37,16
1043  DATA 35,16,16,16,16
1044  DATA 16,16,10,0,0
1045  DATA 0,7,16,2,16
1046  DATA 16,16,16,16,2
1047  DATA 0,0,0,0,0
1048  DATA 2,0,12,8,3
1049  DATA 3,11,0,16,16
1050  DATA 16,169,15,32,100
1051  DATA 248,162,0,160,2
1052  DATA 140,213,64,189,216
1053  DATA 64,201,16,240,20
1054  DATA 10,141,212,64,172
1055  DATA 213,64,32,0,248
1056  DATA 238,212,64,173,212
1057  DATA 64,201,32,144,243
1058  DATA 238,213,64,232,224
1059  DATA 35,144,221,96,0
```

LIST 1

```
*B3F5.B47F

B3F3- 00 00 00 00 00
B3F8- 00 00 00 00 00 00 00 FF
B400- FF 00 00 FF FF 00 00 FF
B408- FF 00 00 FF FF 00 00 00
B410- FF 00 00 00 3F 00 00 FF
B418- FF 00 00 1F FF 00 00 3F
B420- FF 00 00 1F FF 00 00 7F
B428- FF 00 00 7F FF 00 00 0F
B430- FF 00 00 7F FF 00 00 00
B438- 00 00 00 00 FF 00 00 FF
B440- FF 00 00 FF FF 00 00 0F
B448- FF 00 00 3F FF 00 00 FF
B450- FF 00 00 FF FF 00 00 FF
B458- FF 00 00 FF FF 00 00 FF
B460- FF 00 00 3F FF 00 00 07
B468- FF 00 00 FF FF 00 00 FF
B470- FF 00 00 FF FF 00 00 FF
B478- FF 00 00 00 3F 00 00 00
```

LIST 3

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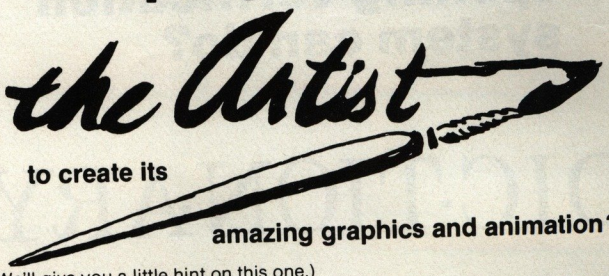
```
:ASM

                1000 *
                1010          .OR $4000
                1020 *--------------------------------
                1030 * SHOW 35 TRACKS AND HOW MUCH OF
                1040 * EACH TRACK IS USED ON THE DISK
                1050 *
                1060 * TRACK BIT MAPS $B3F3 TO B47E
                1070 *--------------------------------
0006-           1080 PTR                  .EQ $06
0008-           1090 COUNT                .EQ $08
0024-           1100 CH                   .EQ $24
0025-           1110 CV                   .EQ $25
B3F3-           1120 BIT.MAPS             .EQ $B3F3
C050-           1130 GRAPHICS             .EQ $C050
C056-           1140 LORES                .EQ $C056
C053-           1150 MIX                  .EQ $C053
F800-           1160 MON.PLOT             .EQ $F800
F836-           1170 MON.CLRTOP           .EQ $F836
F864-           1180 MON.SETCOL           .EQ $F864
FC22-           1190 MON.VTAB             .EQ $FC22
FC42-           1200 MON.CLREOP           .EQ $FC42
FD8E-           1210 MON.CROUT            .EQ $FD8E
FDED-           1220 MON.COUT             .EQ $FDED
                1230 *--------------------------------
                1240 * SET POINTER TO BIT MAPS
                1250 *--------------------------------
                1260 GO
4000- A9 F3     1270          LDA #BIT.MAPS
4002- 85 06     1280          STA PTR
4004- A9 B3     1290          LDA /BIT.MAPS
4006- 85 07     1300          STA PTR+1
4008- A9 00     1310          LDA #0
400A- 8D 02 41  1320          STA TRACK.NUMBER
                1330 *--------------------------------
                1340 COUNT.AND.MAKE.TABLE
400D- A2 08     1350          LDX #$08      INIT INDEX
400F- A0 00     1360          LDY #$00
4011- 8C 01 41  1370          STY TOTAL     INIT COUNTER
4014- B1 06     1380          LDA (PTR),Y
                1390 *--------------------------------
                1400 * COUNT NUMBER OF 0 BITS IN
                1410 * FIRST BYTE OF TRACK BIT MAP
                1420 *--------------------------------
4016- 0A        1430 ONE      ASL           COUNT 0 BITS
4017- B0 03     1440          BCS SET1      BR IF NOT 0
4019- EE 01 41  1450          INC TOTAL     COUNT IT
401C- CA        1460 SET1     DEX
401D- D0 F7     1470          BNE ONE       BR 8 TIMES
                1480 *--------------------------------
401F- A2 08     1490          LDX #$08
4021- C8        1500          INY           SECOND BYTE
4022- B1 06     1510          LDA (PTR),Y
                1520 *--------------------------------
                1530 * COUNT NUMBER OF 0 BITS IN
                1540 * SECOND BYTE OF TRACK BIT MAP
                1550 *--------------------------------
4024- 0A        1560 TWO      ASL           COUNT 0 BITS
4025- B0 03     1570          BCS SET2      BR IF NOT 0
4027- EE 01 41  1580          INC TOTAL     COUNT IT
402A- CA        1590 SET2     DEX
402B- D0 F7     1600          BNE TWO       8 TIMES
                1610 *--------------------------------
                1620 * STORE IN TABLE FOR THIS TRACK
                1630 *--------------------------------
402D- AE 02 41  1640          LDX TRACK.NUMBER
4030- AD 01 41  1650          LDA TOTAL     NO. OF 0 BITS
4033- 9D 03 41  1660          STA TABLE,X   PUT IN TABLE
4036- EE 02 41  1670          INC TRACK.NUMBER
4039- AD 02 41  1680          LDA TRACK.NUMBER
403C- C9 23     1690          CMP #$23      STOP AT 34
403E- F0 10     1700          BEQ DO.GRAPHICS
                1710 *--------------------------------
                1720 * ADVANCE TO NEXT TRACK BIT MAP
                1730 *--------------------------------
4040- 18        1740          CLC
4041- A5 06     1750          LDA PTR       ADD 4 TO PTR
4043- 69 04     1760          ADC #$04
4045- 85 06     1770          STA PTR
4047- A5 07     1780          LDA PTR+1
4049- 69 00     1790          ADC #$00
404B- 85 07     1800          STA PTR+1
404D- 4C 0D 40  1810          JMP COUNT.AND.MAKE.TABLE
                1820 *--------------------------------
                1830 DO.GRAPHICS
4050- AD 50 C0  1840          LDA GRAPHICS
4053- AD 56 C0  1850          LDA LORES
4056- AD 53 C0  1860          LDA MIX
4059- 20 36 F8  1870          JSR MON.CLRTOP
405C- A9 02     1880          LDA #$02      INIT HORIZONTAL
405E- 8D 00 41  1890          STA HORIZONTAL
4061- A9 00     1900          LDA #$00      INIT VERTICAL
4063- 8D FF 40  1910          STA VERTICAL
4066- A9 02     1920          LDA #$02      DARK COLOR
4068- 20 64 F8  1930          JSR MON.SETCOL
                1940 *--------------------------------
                1950 * DRAW VERTICAL LINE COLOR $02
                1960 * TOP TO BOTTOM.  WHOLE SCREEN
                1970 *--------------------------------
                1980 DRAW.DARK
406B- AD FF 40  1990          LDA VERTICAL
406E- AC 00 41  2000          LDY HORIZONTAL
4071- 20 00 F8  2010          JSR MON.PLOT
4074- 18        2020          CLC
4075- AD FF 40  2030          LDA VERTICAL
4078- 69 01     2040          ADC #$01
407A- 8D FF 40  2050          STA VERTICAL
407D- C9 20     2060          CMP #$20
407F- 90 EA     2070          BCC DRAW.DARK
                2080 *--------------------------------
                2090 * ADD 1 TO HORIZONTAL THRU 36
                2100 * BECAUSE WE STARTED AT 2
                2110 * GO BACK AND DO ANOTHER
                2120 *--------------------------------
4081- A9 00     2130          LDA #$00
4083- 8D FF 40  2140          STA VERTICAL
4086- 18        2150          CLC
4087- AD 00 41  2160          LDA HORIZONTAL
408A- 69 01     2170          ADC #$01
408C- 8D 00 41  2180          STA HORIZONTAL
408F- C9 25     2190          CMP #$25
4091- 90 D8     2200          BCC DRAW.DARK
                2210 *--------------------------------
4093- 20 CF 40  2220          JSR DRAW.LIGHT
4096- A9 14     2230          LDA #$14
4098- 85 25     2240          STA CV
409A- 20 22 FC  2250          JSR MON.VTAB
409D- 20 42 FC  2260          JSR MON.CLREOP
40A0- A9 02     2270          LDA #$02
40A2- 85 24     2280          STA CH
40A4- A9 B0     2290          LDA #$B0      LETTER O
```

continued on next page

29. Which top Apple Software Publishing company uses



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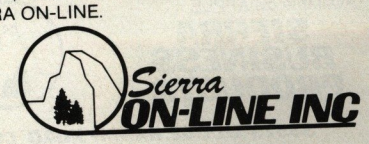

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Disk Map (Cont.)

```
40A6- 20 ED FD 2300          JSR MON.COUT
40A9- A9 13    2310          LDA #$13
40AB- 85 24    2320          STA CH
40AD- A9 C4    2330          LDA #'D+$80  D-DIRECTORY
40AF- 20 ED FD 2340          JSR MON.COUT
40B2- 20 8E FD 2350          JSR MON.CROUT
40B5- A9 00    2360          LDA #$00
40B7- 85 08    2370          STA COUNT    ZERO COUNT
40B9- 85 09    2380          STA COUNT+1
               2390 *--------------------------------
               2400 * ADD UP ALL THE USED SECTORS
               2410 * PUT TOTAL WHERE IT CAN BE USED
               2420 * WHEN NEEDED
               2430 *--------------------------------
40BB- A2 22    2440          LDX #$22
40BD- BD 03 41 2450 LOOP1    LDA TABLE,X
40C0- 18       2460          CLC
40C1- 65 08    2470          ADC COUNT
40C3- 85 08    2480          STA COUNT
40C5- A5 09    2490          LDA COUNT+1
40C7- 69 00    2500          ADC #$00
40C9- 85 09    2510          STA COUNT+1
40CB- CA       2520          DEX
40CC- 10 EF    2530          BPL LOOP1
40CE- 60       2540          RTS
               2550 *--------------------------------
               2560 * PUT IN COLOR $0F
               2570 *--------------------------------
               2580 DRAW.LIGHT
40CF- A9 0F    2590          LDA #$0F
40D1- 20 64 F8 2600          JSR MON.SETCOL
40D4- A2 00    2610          LDX #$00
40D6- A0 02    2620          LDY #$02
40DB- 8C 00 41 2630          STY HORIZONTAL
40DB- BD 03 41 2640 BR9      LDA TABLE,X
40DE- C9 10    2650          CMP #$10     16 BITS ALL 0
40E0- F0 14    2660          BEQ BR2      NO FREE SPACE
40E2- 0A       2670          ASL          DOUBLE COUNT
40E3- 8D FF 40 2680          STA VERTICAL START POSITION
40E6- AC 00 41 2690          LDY HORIZONTAL
40E9- 20 00 F8 2700 BR10     JSR MON.PLOT
40EC- EE FF 40 2710          INC VERTICAL
40EF- AD FF 40 2720          LDA VERTICAL
40F2- C9 20    2730          CMP #$20     DRAW TO BOTTOM
40F4- 90 F3    2740          BCC BR10
40F6- EE 00 41 2750 BR2      INC HORIZONTAL NEXT COLUMN
40F9- E8       2760          INX
40FA- E0 23    2770          CPX #$23     DON'T DO 35
40FC- 90 DD    2780          BCC BR9
40FE- 60       2790          RTS
               2800 *--------------------------------
               2810 VERTICAL
40FF-                .BS 1
               2830 HORIZONTAL
4100-          2840          .BS 1
4101-          2850 TOTAL    .BS 1
               2860 TRACK.NUMBER
4102-          2870          .BS 1
4103-          2880 TABLE    .BS $23
0126-          2890 Z.LENGTH .EQ *-GO
```


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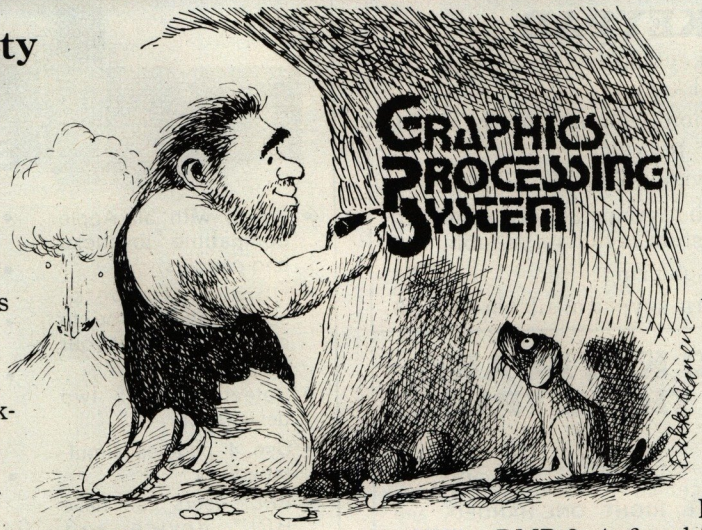

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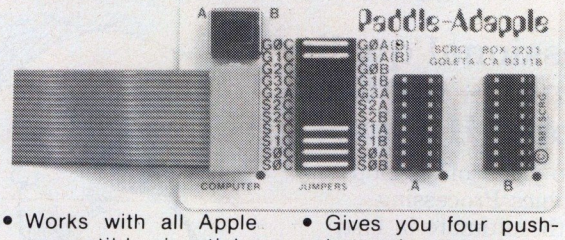

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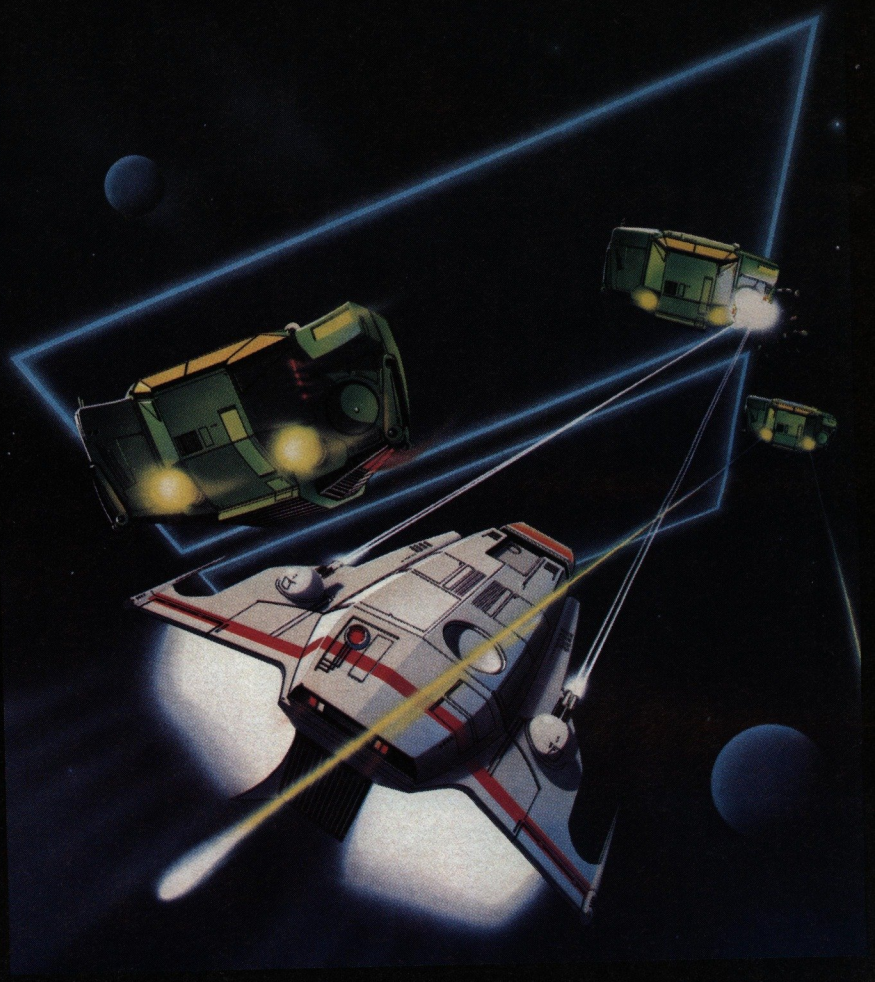

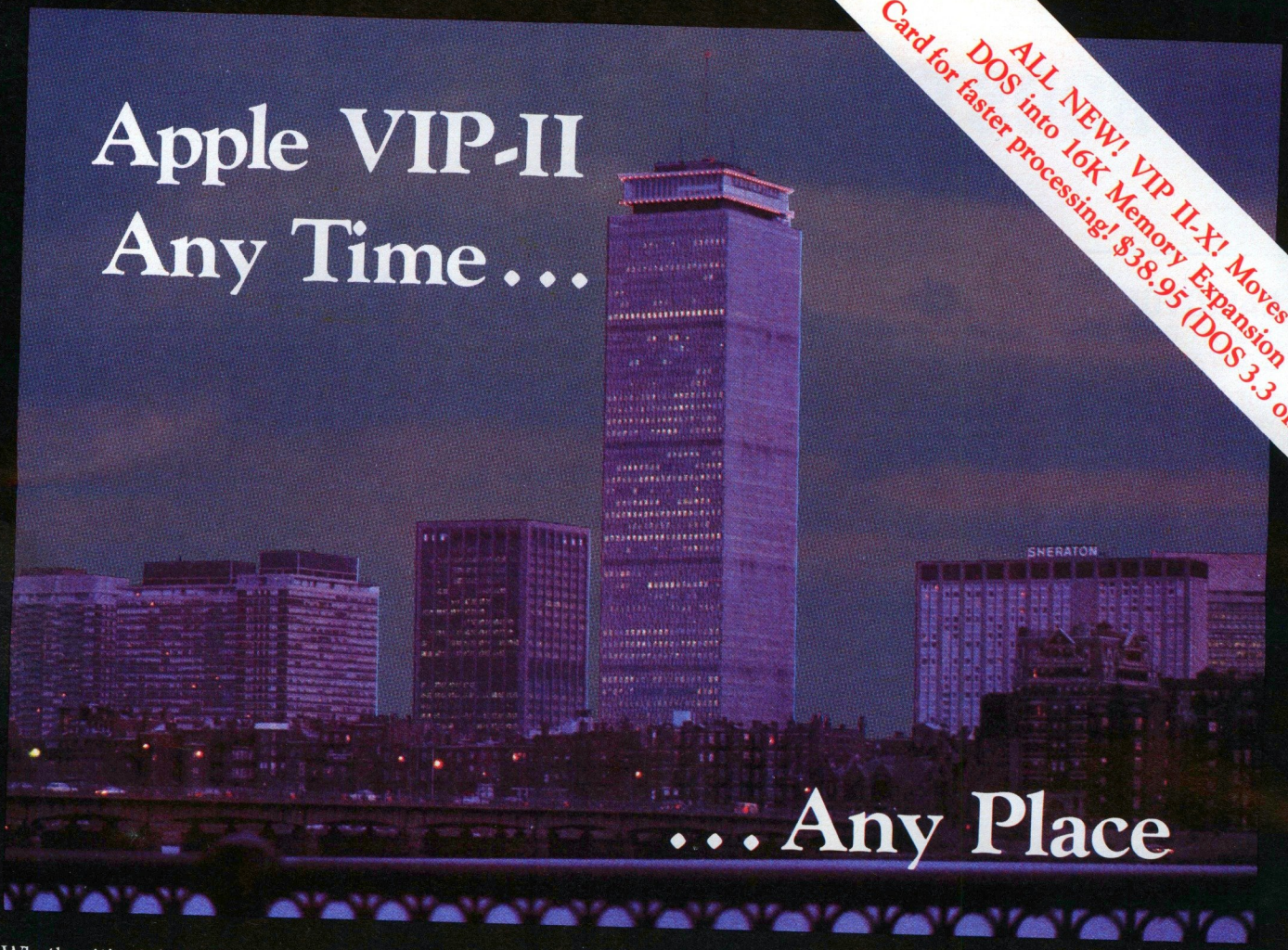

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APPLESOFT LIST FORMATTER

Applesoft List Formatter

by Ed Hauschild
0N740 Morningside Ave.
West Chicago, Ill. 60185

This listing formatter allows control of the format of printed Applesoft listings. The result is very similar to that of the program by Tony S. Dahbura in Vol. 2, No. 5 of Nibble but it is achieved by a totally different method. It is interesting to see how independent approaches to the same problem can result in completely different solutions.

WHAT THE PROGRAM DOES

An assembly language program is inserted between the printer and the normal listing output from Applesoft. This program detects carriage returns and inserts an **extra five spaces** after each one. It also keeps count and inserts **eight extra returns after every fifty eight lines**. The result is an eight line skip over the page perforation and an indent which allows the pages to be punched for insertion into a notebook without losing any part of the print.

The features above were my original goal, but with a little more fiddling it was also possible to add a **title** and **page numbers** to the listing and to allow for output of a string of printer setup characters so that print size or font could be selected.

HOW TO USE IT

The program was produced using the editor and assembler which are a part of Apple's DOS Tool Kit. The program consists of two parts. One is an **EXEC** file which gets the program title, sets up the printer, loads, and then runs the assembly language program. The second part is the actual assembly language patch which is inserted into the output path to the printer.

First, enter the assembly language program starting at address **$300**. Alternatively, you can enter the machine language directly into memory using the method described in the Letters section of this issue. Then save the program with the following command:

BSAVE LISTER.O,A$300,L$A2

Second, create a text file called **LISTER** containing the **Applesoft program** given in the **comments** at the beginning of the assembly language listing. To do this, run the program called LISTER CREATE shown in listing #1. The optional printer setup and restore should be selected to match your printer and the format you want.

For example, with the Epson MX-80 with the Tymac interface card, **CHR$(15)** selects condensed print (132 characters per line) and **CHR$(9);"127N"** causes the listing to come out on a 127 character line. A five space allowance is made for the indent. The printer restore returns the printer to the normal font and returns the line width to the normal forty characters required by the video output routine.

To list an Applesoft program which has been LOADed into memory, just type in

EXEC LISTER

The five statement basic program will be EXECed in and run. Note that **your program to be listed should not have any statements numbered 0 to 5**. You will be prompted for a **title**, the program will be listed, the five line control program will be deleted, and then control will be returned to the keyboard and display.

HOW IT WORKS

Let's first look at the **EXEC** program. The five numbered lines are loaded, and then they are run by the immediate execution **RUN** command at the end of the file.

The **first line** gets the title and the second line pokes it into the memory space identified on lines **138** and **139** of the assembly language listing.

In lines three through five, the printer is set up, the program listed, and the printer restored and turned off. At the end of line five, the first five lines are deleted. When this is done under program control, it causes a halt of the program, so control is returned to the keyboard.

Now let's look at the **assembly language** portion. The Apple has the capability to use a **software switch** to reroute its input and output. The data contained in addresses **$36** and **$37** give the address of the current output routine. The Apple normally sends its output to the video screen, but it can be rerouted through DOS, to a printer, to a MODEM for telephone output, to an 80 column terminal, etc. When the program LISTER.O (starting at **line 54** of the listing) is run, **it changes the address of the current output routine to the program starting at line 63.** This disconnects DOS, but the subroutine call at **line 58** reconnects it with the new output routine intact. See page 105 of the DOS Manual for more information on this. Then the title and page number are printed on the first page by calling the printer subroutine at address **$C102** (for parallel printers; use $C107 for serial printers) for each character.

Finally, the return from subroutine at **line 111** returns to the basic program at **line 5**. The **LIST** instruction is executed with **output being routed to the printer by way of the new program** which counts lines and inserts extra spaces and carriage returns to format the output.

POSSIBLE MODIFICATIONS

The easiest modifications involve changing the page format. The **left margin** can be altered by changing the count in lines **127** and **128**, and the number of spaces defined in lines **129** and **130**. The **right margin** is controlled by the **"127"** in the printer setup string. The top and bottom margins can be changed by starting with the page in a different position and redefining the number of lines printed and skipped in lines **48** and **49**.

The skip to the next page is done by outputting **eight** carriage returns. This was done for maximum compatibility with different printers. If you prefer the paper to move between pages in a continuous transition rather than eight separate jumps, lines **75** through **79** may be replaced by the following two lines to output a **form feed** instead.

```
LDA #FF
JSR PRINT
```

If you are in the habit of using line numbers **1-5** in your programs, the **EXEC** portion can easily be modified to use some other line numbers. Four changes are necessary. **First**, renumber the program as desired. **Second**, change the LIST instruction to exclude the new line numbers. Use two LIST instructions if necessary. **Third**, change the DELETE instruction to remove the new range of line numbers and **finally**, add the beginning line number of your new range to the RUN instruction.

A PITFALL

A possible pitfall in running this program is the definition of the normal address of the printer output routine in **line 40**. In my system, the printer is in **slot #1**. Doing a PR#1 changes the output routine address to **$C100.** The first time a character is output, the program on the printer card runs an initialization routine and then changes the address to **$C102** for subsequent passes. This means that the optional printer setup string should contain at least **1** character. Use a dummy (maybe a space) if no setup is required. It may also mean that the address on line **40** should be changed if your system works differently.

For the very ambitious, it may be possible to use this method for increasingly complicated formatting. For example, if keywords like "IF", "FOR", and "NEXT" were sensed it might be possible to add indenting to emphasize the logic of the program.

continued on next page

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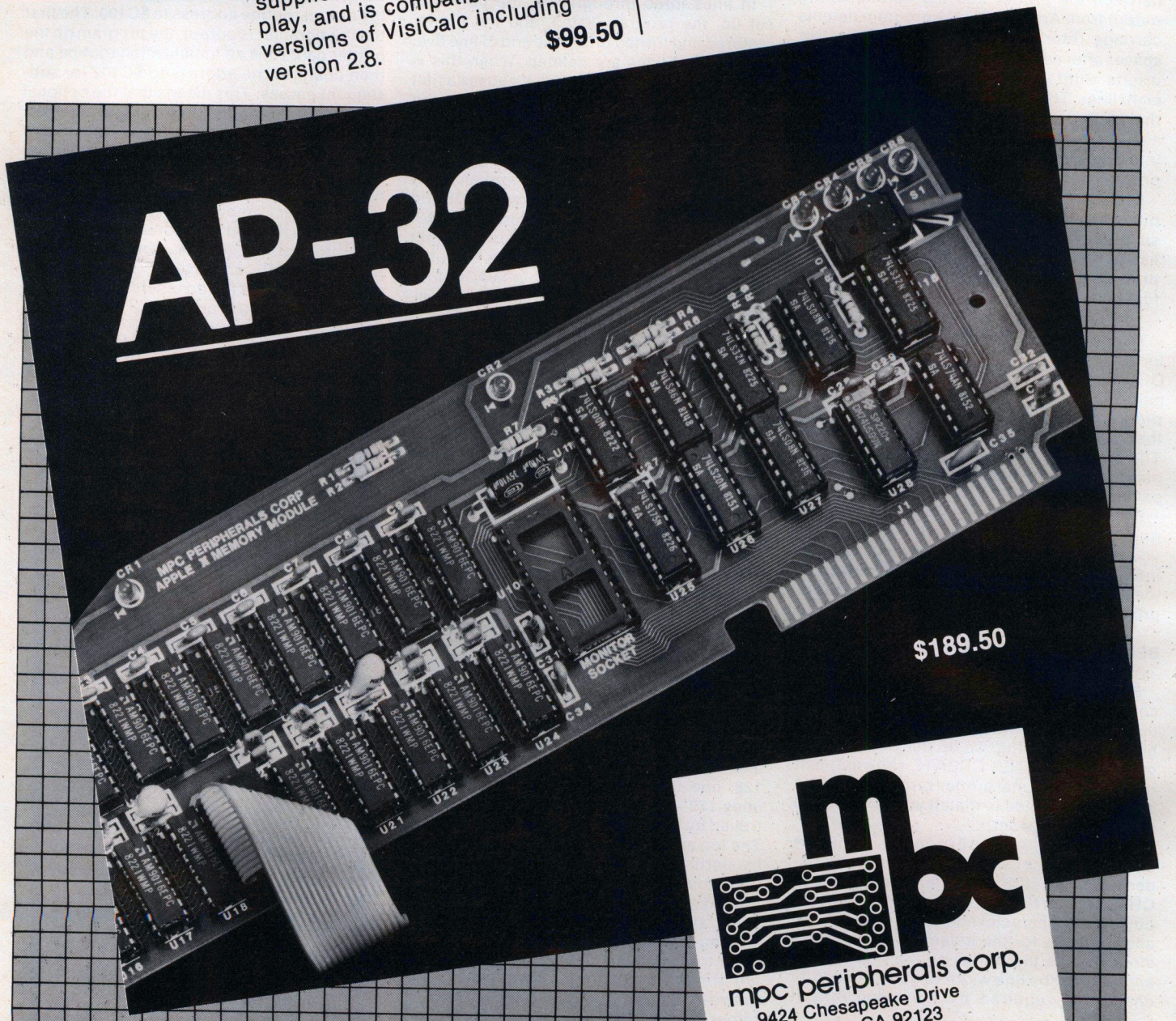

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Applesoft List Formatter (Cont.)

```
]LIST

0  PRINT  CHR$ (4)"OPEN LISTER": PRINT  CHR$ (4)"WRITE
      LISTER": POKE 33,33: LIST 1,5: PRINT "RUN": PRINT
      CHR$ (4)"CLOSE": TEXT : END
1  HOME : INPUT "INPUT TITLE - 32 CHAR MAX, 1 CHAR MIN
        ";A$:A =  LEN (A$): IF A > 32 OR A < 1 GOTO 1
2 D$ =  CHR$ (13) +  CHR$ (4): POKE 930,A - 1: FOR I =
     0 TO A - 1: POKE 931 + I, ASC ( MID$ (A$,A - I,1)
     ): NEXT
3  PRINT D$;"PR#1": PRINT  CHR$ (15); CHR$ (9);"127N"
4  PRINT D$;"BRUN LISTER.O"
5  LIST 6,: PRINT  CHR$ (18); CHR$ (9);"I";: PRINT D$;
     "PR#0": DEL 1,5
```

```
                  2 ************************************************************
0000:             3 *
0000:             4 * LIST APPLESOFT PROGRAMS WITH TITLE, PAGE #, INDENT, AND
0000:             5 * SKIP OVER PAGE PERF
0000:             6 *      BY ED HAUSCHILD
0000:             7 * Copyright © 1982 by Micro-SPARC, Inc.
0000:             8 * USE THIS PROGRAM FROM AN EXEC FILE WITH THE FOLLOWING
0000:             9 *  BASIC COMMANDS
0000:            10 *
0000:            11 *     1 HOME: INPUT "INPUT TITLE - 32 CHAR MAX,
0000:            12 *       1 CHAR MIN   "; A$: A = LEN(A$):
0000:            13 *       IF A>32 OR A<1 GOTO 1
0000:            14 *     2 D$ = CHR$(13) + CHR$(4): POKE 930,A-1:
0000:            15 *       FOR I = 0 TO A-1: POKE 931+I,
0000:            16 *       ASC(MID$(A$,A-I,1)): NEXT
0000:            17 *     3 PRINT D$;"PR#1": PRINT (OPTIONAL PRINTER SETUP)
0000:            18 *     4 PRINT D$;"BRUN LISTER.O"
0000:            19 *     5 LIST 6,: PRINT (OPTIONAL PRINTER RESTORE):
0000:            20 *       PRINT D$;"PR#0": DEL 1,5
0000:            21 *     RUN
0000:            22 *
0000:            23 * THE PROGRAM TO BE LISTED SHOULD NOT HAVE STATEMENTS
0000:            24 * NUMBERED 1 TO 5.
0000:            25 *
0000:            26 * TO GET FULL PAGE WIDTH LISTINGS WITH AN EPSON
0000:            27 * MX-80 PRINTER USE
0000:            28 * (OPTIONAL PRINTER SETUP) = CHR$(15);CHR$(9);"127N"
0000:            29 * (OPTIONAL PRINTER RESTORE) = CHR$(18);CHR$(9);"I"
0000:            30 *
                 31 ************************************************************
0000:            32 *
0000:            33 * ADDRESS REFERENCE EQUATES
0000:            34 *
03EA:            35 TRANSIO EQU  $03EA      ;SUBRTN TO MOVE MON I/O ADDR TO DOS
0036:            36 CSWL    EQU  $0036      ;ADDRESS OF CHAR OUTPUT SWITCH
0037:            37 CSWH    EQU  $0037
FF4A:            38 IOSAVE  EQU  $FF4A      ;MONITOR SUBRTN TO SAVE REGISTERS
FF3F:            39 IORSTR  EQU  $FF3F      ;MONITOR SUBRTN TO RESTORE REGISTERS
C102:            40 PRINT   EQU  $C102      ;ADDRESS OF PRINTER OUTPUT PROGRAM
00FE:            41 MSG     EQU  $00FE      ;ZERO PAGE POINTER TO MESSAGE
0000:            42 *
0000:            43 * CONSTANT EQUATES
0000:            44 *
00A0:            45 SP      EQU  $A0        ;SPACE
008C:            46 FF      EQU  $8C        ;FORM FEED (NEW PAGE)
008D:            47 CR      EQU  $8D        ;CARRIAGE RETURN
0038:            48 LMAX    EQU  56         ;58 LINES/PAGE (56 + 2 IN TITLE)
0008:            49 LSKIP   EQU  8          ;8 LINES SKIPPED BETWEEN PAGES
0000:            50 *
0000:            51 * ENTER HERE 1 TIME ON SETUP
0000:            52 *
----- NEXT OBJECT FILE NAME IS LISTER.O
0300:            53         ORG  $300
0300:A9 0E       54         LDA  #>PATCH    ;SET UP NEW CHAR OUTPUT SWITCH ADDRESS
0302:85 36       55         STA  CSWL
0304:A9 03       56         LDA  #<PATCH
0306:85 37       57         STA  CSWH
0308:20 EA 03    58         JSR  TRANSIO    ;MOVE OUTPUT SWITCH ADDRESS TO DOS
030B:4C 36 03    59         JMP  TTLOUT     ;SET UP FIRST PAGE
030E:            60 *
030E:            61 * ENTER HERE FOR EACH CHARACTER TO BE PRINTED
030E:            62 *
030E:20 4A FF    63 PATCH   JSR  IOSAVE     ;SAVE PROCESSOR REGISTERS
0311:20 3F FF    64         JSR  IORSTR     ;RECOVER REGISTERS
0314:C9 8C       65         CMP  #FF        ;IS THE OUTPUT CHARACTER A FORM FEED
0316:F0 0F       66         BEQ  NEWPAGE    ;IF SO, JUMP
0318:C9 8D       67         CMP  #CR        ;IS THE OUTPUT CHAR A CARRIAGE RET
031A:F0 06       68         BEQ  NEWLINE    ;IF SO, JUMP
031C:20 02 C1    69         JSR  PRINT      ;OTHERWISE, PRINT THE CHARACTER
031F:4C 80 03    70         JMP  RESTORE
0322:CE 91 03    71 NEWLINE DEC  LCNT       ;LAST LINE?
0325:D0 4E       72         BNE  LS         ;IF NOT, SET UP THE INDENT
0327:A9 38       73 NEWPAGE LDA  #LMAX      ;RESET THE LINE COUNTER
0329:8D 91 03    74         STA  LCNT
032C:A0 08       75         LDY  #LSKIP     ;COUNTER FOR LINES BETWEEN PAGES
032E:A9 8D       76         LDA  #CR        ;OUTPUT A CARRIAGE RETURN
0330:20 02 C1    77 CRLOOP  JSR  PRINT
```

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Applesoft List Formatter (Cont.)

```
0333:88          78          DEY                ;8 RETURNS OUT YET?
0334:10 FA       79          BPL  CRLOOP        ;IF NOT, PUT OUT ANOTHER ONE
0336:A0 04       80 TTLOUT   LDY  #SPWRCNT      ;# CHARS IN 5 SPACE INDENT - 1
0338:A9 94       81          LDA  #>SPMSG       ;LOAD POINTER TO MESSAGE
033A:A2 03       82          LDX  #<SPMSG
033C:20 84 03    83          JSR  MSGOUT        ;OUTPUT THE MESSAGE
033F:AC A2 03    84          LDY  TTLCNT        ;LOAD # OF CHARACTERS IN THE TITLE
0342:A9 A3       85          LDA  #>TTLMSG      ;LOAD POINTER TO TITLE
0344:A2 03       86          LDX  #<TTLMSG
0346:20 84 03    87          JSR  MSGOUT        ;PRINT THE TITLE
0349:A0 07       88          LDY  #PGCNT        ;# OF CHARS IN THE PAGE MESSAGE - 1
034B:A9 9A       89          LDA  #>PGMSG       ;LOAD POINTER TO PAGE
034D:A2 03       90          LDX  #<PGMSG
034F:20 84 03    91          JSR  MSGOUT        ;PRINT THE PAGE
0352:AD 92 03    92          LDA  PCNT          ;PRINT THE PAGE #
0355:20 02 C1    93          JSR  PRINT
0358:AD 93 03    94          LDA  PCNT+1
035B:20 02 C1    95          JSR  PRINT
035E:A9 8D       96          LDA  #CR           ;SKIP A LINE AFTER THE TITLE
0360:20 02 C1    97          JSR  PRINT
0363:EE 93 03    98          INC  PCNT+1        ;INCREMENT PAGE #
0366:A9 BA       99          LDA  #$BA          ;CHECK FOR CARRY TO TENS DIGIT
0368:CD 93 03   100          CMP  PCNT+1
036B:D0 08      101          BNE  LS            ;IF NOT, START THE NEXT LINE
036D:EE 92 03   102          INC  PCNT          ;IF SO, INCREMENT THE TENS DIGIT
0370:A9 B0      103          LDA  #$B0          ;AND ZERO THE ONES DIGIT
0372:8D 93 03   104          STA  PCNT+1
0375:A0 05      105 LS       LDY  #SPRCNT       ;# CHARS IN NEWLINE MESSAGE - 1
0377:A9 94      106          LDA  #>SPMSG       ;LOAD POINTER TO MESSAGE
0379:A2 03      107          LDX  #<SPMSG
037B:85 FF      108          STA  MSG+1
037D:20 84 03   109          JSR  MSGOUT        ;QUTPUT THE MESSAGE
0380:20 3F FF   110 RESTORE  JSR  IORSTR        ;RESTORE REGISTERS BEFORE RETURNING
0383:60         111          RTS
0384:           112 *
0384:           113 * SUBROUTINE TO PRINT A MESSAGE
0384:           114 *
0384:85 FE      115 MSGOUT   STA  MSG           ;TRANSFER THE POINTER TO ZERO PAGE
0386:86 FF      116          STX  MSG+1
0388:B1 FE      117 MSGLOOP  LDA  (MSG),Y       ;GET THE NEXT CHARACTER
038A:20 02 C1   118          JSR  PRINT         ;PRINT IT
038D:88         119          DEY                ;LAST CHARACTER?
038E:10 F8      120          BPL  MSGLOOP       ;IF NOT, PRINT THE NEXT ONE
0390:60         121          RTS
0391:           122 *
0391:           123 * DEFINE VARIABLE SPACE
0391:           124 *
0391:38         125 LCNT     DFB  LMAX          ;COUNTER FOR LINES PER PAGE
0392:B0 B1      126 PCNT     ASC  '01'          ;COUNTER FOR NUMBER OF PAGES
0005:           127 SPRCNT   EQU  5             ;# OF CHARS IN SPACE MSG WITH CR - 1
0004:           128 SPWRCNT  EQU  4             ;# OF CHARS IN SPACE MSG W/O CR - 1
0394:A0 A0 A0   129 SPMSG    DFB  SP,SP,SP      ;5 SPACES
0397:A0 A0      130          DFB  SP,SP
0399:8D         131          DFB  CR            ;CARRIAGE RETURN
0007:           132 PGCNT    EQU  7             ;#OF CHARS IN PAGE MESSAGE - 1
039A:A0         133 PGMSG    DFB  SP            ;PAGE MESSAGE = " - PAGE "
039B:C5 C7 C1   134          ASC  'EGAP'
039E:D0
039F:A0         135          DFB  SP
03A0:AD         136          ASC  '-'
03A1:A0         137          DFB  SP
03A2:           138 TTLCNT   EQU  *             ;SPACE FOR # OF CHARS IN TITLE - 1
03A3:           139 TTLMSG   EQU  *+1           ;SPACE FOR TITLE - NEXT 32 CHARS

*** SUCCESSFUL ASSEMBLY: NO ERRORS
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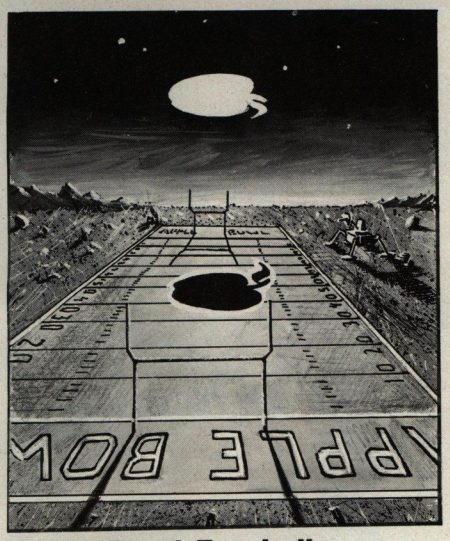
Apple Bowl Football



Apple Bowl Football

by Preston R. Black, MD
Richard I Morris Jr.
The Durham Software Group
16 Durham St.
Boston, MA 02115

Any true football fan is by nature a grandstand or Monday morning quarterback. How many times have you said to yourself after the hometown favorites had blown another one, "If I was the quarterback I would never have called a pass play in that situation. Everyone in the stadium was looking for it. I would have tried a screen pass or a draw!"? Well, here's your chance to put your words into action. Apple Bowl Football is an interactive strategy game which gives you the opportunity to test your play-calling ability against the Apple II. You have your choice of **three passing plays** and **four running plays.** A **full kicking game** including quick kicks is also available. There are **safeties, long runs,** and **long passing bombs.** Your quarterback can be sacked and you can fumble on any play. Don't get caught offsides or clipping. If you are caught, you will have penalty yards marked off against you.

PLAYING APPLE BOWL FOOTBALL

Apple Bowl Football requires at least 32K of memory when DOS is used concurrently. If DOS is not used and if the REM statements and the instructions are removed, the game can probably be squeezed into 16K.

Operating the program is fairly easy. Most things are self-evident and almost everything else is explained within the program. At the start of your first game you are asked to initialize the random number generator (as explained above) and to set the video output speed. The Scoreboard leaves only a small text area at the bottom of the screen. Consequently, the **play-by-play narrative** can scroll off the screen before it is comprehended. By **slowing down the display**, time is allowed for the player to read the play-by-play narrative. For new players of Apple Bowl Football, a speed of **2** or **3** (equivalent to **SPEED=105** and **SPEED=155** respectively) is recommended. After the player becomes more familiar with the game, he may wish to use a speed of **4** or **5** (**SPEED=205** and **SPEED=255** respectively).

THE PLAYS

A listing of the plays available in Apple Bowl Football is given with the instructions and can be relisted at any time during the game by entering **"PLAYS"** when the Apple II prompts the player with **"NEW PLAY:"**. A listing of the plays is also given in **Table 1** to facilitate the flow of the game.

TABLE 1

The current plays available in Football:

LPASS — LONG PASSING PLAY
SPASS — SHORT PASSING PLAY
SCRN — SCREEN PASS
MRUN — RUN UP THE MIDDLE
OTRUN— OFF TACKLE RUN
DRAW — DRAW PLAY
SWEEP — A SWEEP
PUNT — A PUNT
QKKIK — A QUICK KICK
FLDGL — A FIELD GOAL ATTEMPT
STAT — LIST OF CURRENT STATISTICS
TMOUT— TAKES A TIME-OUT
PLAYS — GIVES A LIST OF AVAILABLE PLAYS

The original version of this program was written by us in FORTRAN IV on a PDP-10 time-sharing system. When we purchased our Apple II, the program was translated into Applesoft. Many changes have been made in the program since the original version. Most of these have been to incorporate the special features of Applesoft Basic and the Apple II. The final product of eight years of various versions is Football. Over the years we have had many hours of enjoyment from this game. We hope that the readers of NIBBLE will enjoy this program as much as we have.

THE PASSING GAME

Every attempt has been made to make the Apple Bowl Football game realistic. As in an actual football game, the player is more likely to complete a screen pass than a short pass down field. And the completion rate for long passes is lower than for short passes. But if the defense reads your screen pass, you may lose yardage. Any of the pass plays can break for a long gainer. Pass too frequently, and the computer will recognize this tendency and make adjustment to its defense. Interceptions and quarterback sacks then become more likely.

THE RUNNING GAME

The running game is also realistic. Sweeps and draws are more wide open and can gain more yardage than running plays up the middle. But they are more likely to lose yardage than conservative plays such as runs off tackle or runs up the middle. It is also more difficult to gain yardage in an obvious running situation such as third or fourth down and short yardage, or whenever you are inside your opponent's ten yard line. Again, all of the running plays can be broken for long gainers.

THE KICKING GAME

The player has a complete kicking game. The plays include punts and as a surprise, you can also quick kick. Because they are unexpected, quick kicks are usually longer than punts and the returns are shorter. But quick kicks on a fourth down fool no one and are treated as punts.

The player also has a very accurate, strong-legged placekicker. Field goals can be attempted from anywhere on the field. But should you miss an attempt from outside the twenty yard line, your opponent will start from the original line of scrimmage. If the field goal is short, it will be returned by your opponent.

TIMING

Are the last two minutes of each half your favorite? Do not despair. Even though there are no commercials, a two minute warning (with a timeout) is issued each half. You have three time outs per half. Using them wisely in your two minute drill will allow the player to move into scoring position before the end of the half, or score the winning touchdown in the waning moments of the game. If the score is tied after four quarters of play, a sudden victory overtime period is automatically invoked for one more try.

Defensive plays are always called by the Apple II. Prior versions of the program have had a player-called defense feature. But this feature slowed down the flow of the game so much, it was finally removed. The Apple II is impartial on defense selection. Regardless of who is on offense **the Apple II will try to anticipate plays based on patterns and field position.**

STATISTICS

Do you want to know how well your defensive and offensive teams are performing? How many plays have you run? What is your passing, running, and total yardage? What is your average gain per carry? What is your average yardage per pass? How well are your punter and kicker performing? How many turnovers have there been? How many penalty yards have been assessed against you? What is your opponent's total yardage? How many times has your defensive unit sacked your opponent's quarterback? Apple Bowl Football keeps full statistics (which are always current). These statistics can be displayed **at any time** during the game to answer all of the questions posed above. The statistics are automatically displayed at the end of each half.

THE SCOREBOARD

Perhaps the most innovative feature of Apple Bowl Football is the Scoreboard which is always displayed on the top half of the TV screen. Formatted like a stadium scoreboard, the display includes the time left in the quarter, the down and ball placement, the score, the current quarter, and possession data. The scoreboard is updated after every play and has all the information needed for decision making. The lower half of the screen displays the play-by-play narrative.

PROGRAMMING LOGIC

Mathematically, football is a game of probabilities. Each play has a statistical probability of success and another probability determines the **magnitude** of that success. They

continued on next page

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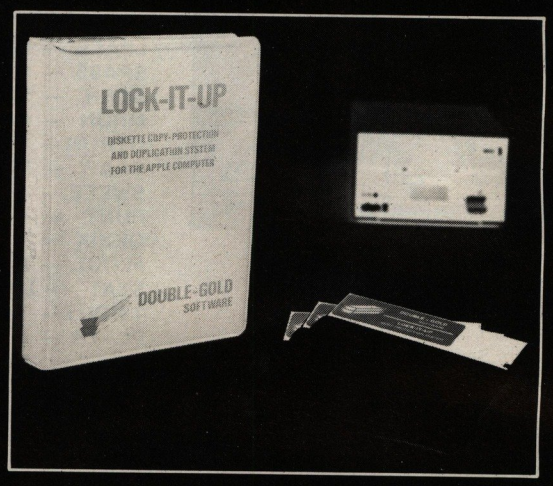

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REQUIRES: 48K Apple II or II+ with Applesoft in ROM or language system and at least two disk drives.

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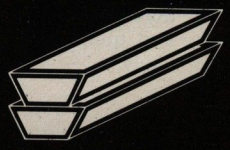
- Compatible with Apple Fortran.

REQUIRES: Apple Pascal and at least two disk drives.



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Apple Bowl Football (Cont.)

both depend upon a multitude of factors. Reviewing professional football annual statistics reveals many interesting facts. While football is usually thought of as primarily a passing game, **passing accounts for less than 40% of all football plays.** And the **average pass gains only 8 to 10 yards.** Furthermore, only 45 to 55% of passes are completed. Moreover, the **average running play gains only 2.5 to 3.5 yards.**

Statistics of this nature are used in Apple Bowl Football. Parameters are set based on these statistics, and random numbers are generated to decide the outcome of a particular play. In addition, special parameters are incorporated for those situations considered "special" in real football. Thus it is more difficult to complete a pass on third down and long yardage, or to gain yardage on the ground within your opponent's ten yard line. Yardage gained is also determined by parameters designed for each play and the generation of random numbers. For example, the parameters of running plays are designed so that **the average sweep will gain more than the average run** up the middle. Yet **you are less likely to lose yardage on the more conservative play.** Likewise a long pass will gain more yardage than a screen pass. But the long pass is more likely to be incomplete or intercepted. The length of punts and punt returns are based on similar algorithms.

Whether a penalty, a fumble, or bonus yardage occurs is determined on each play. Again, parameters are set and random numbers are generated to decide the outcome when the **FUMBLE, PENALTY,** or **BONUS** routines are called in the program. The success or failure of field goals is also determined **statistically.** The longer the field goal attempt, the more likely that it will be unsuccessful. But short field goals are not sure things either. They too can be missed. Even points after touchdowns will occasionally be missed.

Overall parameters have been set to simulate those observed in real football games. Every effort has been made to make Apple Bowl Football as realistic as possible.

RANDOM NUMBERS

Most of the coding in Apple Bowl Football is straightforward. Since the program makes extensive use of random numbers, we will briefly discuss the Applesoft random number generator. The implementation of the Scoreboard feature and the Scoreboard Updater will also be analyzed.

The pseudo-random number generator resident in Applesoft Basic is very interesting. Unlike the pseudo-random number generator found in Integer Basic, Applesoft's generates random numbers **between 0 and 1.** In Integer Basic, the command RND(X) will return a random integer between 1 and X. In Applesoft the argument is used to set the function mode. A **positive** argument (greater than 0) generates a new random number each time the function is called. An argument of **zero** returns the most recently generated random number. A **negative** argument sets a **sequence** of random numbers to be used. This sequence will be repeated each time the same negative argument is used. The random number generated is always positive and between 0 and 1.

Moreover, pseudo-random number generators like the one in Applesoft usually generate the same table for a given seed number. Since the seed cannot be set randomly — the first number is predictable — a way to randomize the sequence has to be found. For those readers with a clock card, the time can be used to randomize the seed. Those of us without clocks must find another way. Otherwise, whenever Apple Bowl Football is played, the first game would always be exactly the same as the first game played on a previous occasion. Therefore, the player is allowed to set the random number generator at the beginning of the first game he plays. Yet the player has the option to **replay** games if he so desires by entering the same number to set the function at the start of the game. Remember the game must be repeated exactly the same, with the same plays, to get the same result.

In Applesoft the expression **X*RND(1)+1** will give a random number between **1** and **X**. We are only interested in the integer values for the random numbers in the game. Since we use random numbers so frequently, we defined a function, using the **DEF FN** of Applesoft, to give a random integer from **1** to **X**, when X is the argument of the function defined. This is implemented in **line 160.**

HOW THE SCOREBOARD WORKS

Implementation of the Scoreboard takes advantage of the text screen control that Applesoft affords the programmer. The video display of the Apple II in the TEXT mode has the capacity for 960 characters in a twenty-four line by forty column matrix. By **assigning a column and line value to a character**, the programmer can place a character anywhere on the screen. The **VTAB** and **HTAB** commands provide a method to do this.

The **VTAB** command moves the cursor to the **line** designated by its argument. **VTAB uses absolute moves**, relative only to the top and bottom of the screen; it ignores the text window. If VTAB moves the cursor below the text window, normal scrolling is active on all subsequent printing.

HTAB moves the cursor to the **position** designated by its argument on the current screen line. HTAB's moves are **relative to the left margin of the current screen line.** HTAB ignores the text screen, operating within the current line. HTAB can move the cursor to the left or to the right.

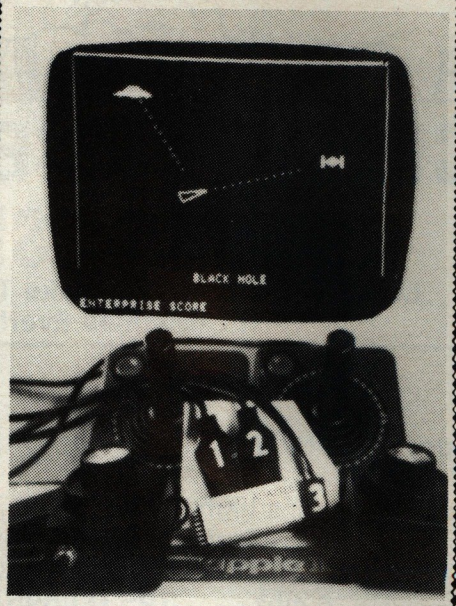
TAB is similar to HTAB with these important differences: **First**, TAB **must** be used in a PRINT statement. **Second**, TAB moves the cursor to the right of the cursor's current position. If the value of the argument for TAB is less than the current cursor position, the cursor will not move. **Third**, TAB has an interesting idiosyncrasy. Within a single PRINT statement the TAB does not affect characters previously printed on the current line. However, if the TAB is in another PRINT statement that references a line on the screen that has been previously printed on, the TAB becomes similar to printing spaces and all the text previously written on that line will be erased.

TEXT WINDOWS

Applesoft Basic also allows you to partition the text screen into **"windows"** of any dimensions. A familiar example of such a text window is the four lines at the bottom of the low resolution graphics display for text. There are **four special POKE commands to set the size of the "window" for the screen.** Within this window text will be shown and scrolled.

continued on next page

AT LAST!



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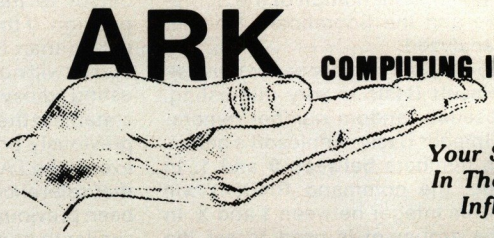

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Apple Bowl Football (Cont.)

POKE 32,L will set the left margin of the text screen to the value specified by **L. L** can be in the range from **0 to 39** where **0** is the left margin. Note that the width of the window is not changed by this command; this means that the right margin is moved by the same amount as the left margin.

POKE 33,W sets the **width** (i.e. the number of characters per line) of the text screen to the value of **W**, which can be in the range from **1** through **40**. **W** cannot be zero; POKE 33,0 bombs Applesoft.

POKE 34,T sets the **top margin** of the text screen to the value specified by **T. T** can be in the range from **0** to **23**, where **0** is the top line of the screen.

POKE 35,B sets the **bottom margin** of the text screen to the value specified by **B. B** can be in the range from **0** to **23**, where **23** is the bottom line on the screen. Never set the bottom of the window (B) above the top of the window (T).

The programmer can use these commands to control output to the screen and customize output to suit his needs.

The SCOREBOARD routine takes advantage of some of these Applesoft features. After the screen has been cleared by the HOME command, the VTAB and HTAB commands are used to construct the scoreboard. Advantage is taken of HTAB's ability to use a variable as an argument to properly place the scores for each quarter (line 340). Once the scoreboard has been constructed, POKE 34,16 (line 420) sets the text window so that the scoreboard is not overwritten.

The SCOREBOARD UPDATER routine relies upon the fact that VTAB does not recognize the text window to make changes in the scoreboard. We can change those parts of the scoreboard that need changing without affecting other parts of the scoreboard. The VTAB 24 in line 600 returns us to the text screen, again preventing the scoreboard from being overwritten. The remainder of the scoreboard implementation and updating are easily understood from reviewing the program listing.

The interested reader can explore the remainder of the design of Apple Bowl Football by studying the program listing. The various routines are clearly delineated by REM statements and are easily found.

continued on next page

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```
10  REM   *********************
20  REM   * APPLE FOOTBALL 3.0 *
30  REM   *                   *
40  REM   * BY PRESTON BLACK   *
50  REM   * AND RICHARD MORRIS *
60  REM   *                   *
70  REM   * COPYRIGHT (C) 1982 *
80  REM   * BY MICRO-SPARC INC *
90  REM   * LINCOLN, MA. 01773 *
100  REM  *********************
110  DEF  FN Z(X) =  INT (X * 100 + .5) /  INT (100.5)
120  DIM DS(9),SUB(2)
130 W1$ = "GAINS":W2$ = "LOSES"
140  DIM FIRST(2),ZPLAY(2),RUSH(2),PASS(2),PUNT(2),YPUNT(2),
     FLD(2),MADE(2),XPUNT(2),FUM(2),RECO(2),NENT(2),NPEN(2),PPEN(
     2),LOSS(2),COMP(2),YRUSH(2),RPASS(2),PLAY$(15),TEAM$(2),SCR(
     4,2),TMOUT(2),DFEN$(10),YARD(2),PDN(2)
150  DIM KZ(4,3),VSAK(2)
160  DEF  FN A(X) =  INT (X *  RND (1)) + 1: DEF  FN B(X) =
     (X / 2) - ( INT (X / 2))
170  FOR I = 1 TO 12: READ PLAY$(I): NEXT : DATA   LPASS,SPA
     SS,SCRN,MRUN,DRAW,SWEEP,OTRUN,PUNT,QKKIK,FLDGL,TMOUT,STAT
180  FOR I = 1 TO 3: FOR J = 1 TO 4: READ KZ(J,I): NEXT J: N
     EXT I: DATA  4,2,2,3,4,3,5,4,4,10,8,6
190  FOR I = 1 TO 2:RUSH(I) = 0:FUM(I) = 0:RECO(I) = 0:NENT(
     I) = 0:PASS(I) = 0:COMP(I) = 0:LOSS(I) = 0:YRUSH(I) = 0:RPAS
     S(I) = 0:FIRST(I) = 0:YPUNT(I) = 0:XPUNT(I) = 0:FLD(I) = 0:M
     ADE(I) = 0:NPEN(I) = 0:PPEN(I) = 0: NEXT
200  FOR I = 1 TO 2:VSAK(I) = 0: NEXT
210  GOTO 4770
220  REM
230  REM    ***SCOREBOARD***
240  REM
250  SPEED= 255: TEXT : HOME : HTAB 15: PRINT "SCOREBOARD"
260 NMIN =  INT (ITIME / 60):NSEC =  INT (ITIME - (NMIN * 60
     ))
270  VTAB 3: HTAB 17
280  IF ITIME > 0 THEN 300
290  PRINT " 0:00": GOTO 330
300  IF NMIN < 10 THEN  PRINT " ";
310  PRINT NMIN;":";: IF NSEC < 10 THEN  PRINT "0";
320  PRINT NSEC
330  VTAB 6: FOR I = 1 TO 4:DS = 8 + 4 * I: IF I = QTR THEN
      FLASH
340  HTAB DS: PRINT I;: NORMAL : NEXT : PRINT  TAB( 28);"TOT
     AL"
350  FLASH : VTAB 8: IF AN = 1 THEN  PRINT "*";:
360  NORMAL : PRINT  TAB( 2);TEAM$(1);: FOR I = 1 TO 4:DS =
     8 + 4 * I: PRINT  TAB( DS);SCR(I,1);: NEXT : PRINT  TAB( 29)
     ;L1
370  FLASH : IF AN = 2 THEN  PRINT "*";
380  NORMAL : PRINT  TAB( 2);TEAM$(2);: FOR I = 1 TO 4:DS =
     8 + 4 * I: PRINT  TAB( DS);SCR(I,2);: NEXT : PRINT  TAB( 29)
     ;L2
390  VTAB 11: PRINT "BALL ON THE ";TEAM$(YARD(1));" ";YARD(2
     );" YARD LINE"
400  VTAB 13: PRINT "DOWN=";DOWN; TAB( 20);YSTGO;" YARDS TO
     GO"
410  VTAB 15: PRINT "-----------------------------------------
     -"
420  POKE 34,16: VTAB 24: SPEED= ISPD: RETURN
430  REM
440  REM    ***SCOREBOARD UPDATER***
450  REM
460 NMIN =  INT (ITIME / 60):NSEC =  INT (ITIME - (NMIN * 60
     ))
470  SPEED= 255: IF ITIME > 0 THEN 490
480  VTAB 3: HTAB 18: PRINT "0:00": GOTO 600
490  VTAB 3: HTAB 17: IF NMIN < 10 THEN  PRINT " ";
500  PRINT NMIN;":";: IF NSEC < 10 THEN  PRINT "0";
510  PRINT NSEC: VTAB 24: GOTO 600
520  SPEED= 255: VTAB 6:DS = 8 + 4 * (QTR - 1): PRINT  TAB(
     DS);(QTR - 1);:DS = 8 + 4 * QTR: FLASH : PRINT  TAB( DS);QTR
     : NORMAL : VTAB 24: GOTO 600
530  SPEED= 255: ON AN GOTO 540,550
540  VTAB 8: FLASH : PRINT "*": NORMAL : VTAB 9: PRINT " ":
     GOTO 600
550  VTAB 8: PRINT " ": VTAB 9: FLASH : PRINT "*": NORMAL :
     GOTO 600
560 DS = 8 + 4 * QTR: VTAB 8: HTAB DS: PRINT SCR(QTR,1);: HT
     AB 29: PRINT L1: VTAB 9: HTAB DS: PRINT SCR(QTR,2);: HTAB 29
     : PRINT L2: GOTO 600
570  SPEED= 255: VTAB 11: HTAB 13: PRINT  TAB( 27): VTAB 11:
      HTAB 13: PRINT TEAM$(YARD(1));" ";YARD(2);" YARD LINE      "
580  VTAB 13: HTAB 6: PRINT DOWN;: HTAB 20: IF YSTGO < 10 TH
     EN  PRINT " ";
590  PRINT  TAB( 15): VTAB 13: HTAB 20: PRINT YSTGO;" YARDS
     TO GO      "
600  SPEED= ISPD: VTAB 24: RETURN
610  REM
620  REM    ***BONUS***
630  REM
640 XRAN =  RND (2):DS(1) = 10: FOR I = 2 TO 9:DS(I) = DS(I
     - 1) + 5: NEXT
650  IF XRAN * 20 >  = 1 THEN 750
660 NB = 1: IF XRAN * 30 <  = 1 THEN NB = 2
670  IF XRAN * 40 <  = 1 THEN NB = 3
680  IF XRAN * 50 <  = 1 THEN NB = 4
690  IF XRAN * 60 <  = 1 THEN NB = 5
700  IF XRAN * 70 <  = 1 THEN NB = 6
710  IF XRAN * 80 <  = 1 THEN NB = 7
720  IF XRAN * 90 <  = 1 THEN NB = 8
730  IF XRAN * 100 <  = 1 THEN NB = 9
740 BNUS = DS(NB):XRAN = 0: GOTO 760
750 BNUS = 0:XRAN = 0
760  RETURN
770  REM
780  REM    ***FUMBLE***
790  REM
800 CHANCE =  FN A(100): IF CHANCE <  = 1 THEN 820
810 FUMBL = 0:RECOV = 0: GOTO 890
820 FUMBL = 1:FUM(AN) = FUM(AN) + 1: PRINT : PRINT TEAM$(AN)
     ;" FUMBLES!!!"
830 RECOV =  FN A(2): IF RECOV = AN THEN 870
840 SET = AN:AN = OFF:OFF = SET:NPLY = NPLY + 1:ITIME = ITIM
     E - 5:DOWN = 1:YSTGO = 10
850  IF YARD(1) <  > AN AND YARD(2) < 10 THEN YSTGO = YARD(2
     )
860  GOTO 880
870 FUMBL = 0:RECO(AN) = RECO(AN) + 1:RECOV = 0
880  PRINT : PRINT TEAM$(AN);" RECOVERS!!!": PRINT : PRINT "
     BALL ON THE ";TEAM$(YARD(1));" ";YARD(2);" YARD LINE"
890  RETURN
900  REM
910  REM    ***PENALTY***
920  REM
930 KFIRST = 0:CHANCE =  FN A(100): IF CHANCE <  = 5 THEN 95
     0
940 PENALT = 0: RETURN
950 YFIX =  FN A(100):YDS = 5: IF YFIX > 66 THEN YDS = 15
960 XTM =  FN A(2)
970  IF XTM = OFF THEN 1070
980  IF YARD(1) = OFF THEN 1030
990  IF YARD(2) > 20 THEN 1020
1000 XDS =  INT (YARD(2) / 2): IF YDS = 5 AND XDS < 5 THEN Y
     DS = XDS
1010  IF YDS = 15 THEN YDS = XDS
1020 YARD(2) = YARD(2) - YDS: GOTO 1160
1030  IF YARD(2) > 35 THEN 1050
1040 YARD(2) = YARD(2) + YDS: GOTO 1160
1050  IF YARD(2) <  = 45 AND YDS = 5 THEN 1040
1060 YARD(1) = AN:YARD(2) = 50 - (YARD(2) + YDS - 50): GOTO
     1160
1070  IF YARD(1) = AN THEN 1120
1080  IF YARD(2) > 20 THEN 1110
1090 XDS =  INT (YARD(2) / 2): IF YDS = 5 AND XDS < 5 THEN Y
     DS = XDS
1100  IF YDS = 15 THEN YDS = XDS
1110 YARD(2) = YARD(2) - YDS: GOTO 1160
1120  IF YARD(2) > 35 THEN 1140
1130 YARD(2) = YARD(2) + YDS: GOTO 1160
1140  IF YDS = 5 AND YARD(2) <  = 45 THEN 1040
1150 YARD(1) = OFF:YARD(2) = 50 - (YARD(2) + YDS - 50)
1160 NPEN(XTM) = NPEN(XTM) + 1:PPEN(XTM) = PPEN(XTM) + YDS:
     IF KICK = 1 THEN 1230
1170  IF XTM = AN THEN 1220
1180 YSTGO = YSTGO - YDS:
1190  IF YSTGO > 0 THEN 1230
1200 DOWN = 1:YSTGO = 10: IF YARD(1) = OFF AND YARD(2) < 10
     THEN YSTGO = YARD(2)
1210 KFIRST = 1:FIRST(AN) = FIRST(AN) + 1: GOTO 1230
1220 YSTGO = YSTGO + YDS
1230  IF YDS <  > 5 AND YDS <  > 15 THEN 1250
1240  PRINT : PRINT "<<PENALTY ON ";TEAM$(XTM);">>  ";YDS;"
     YARDS": PRINT "BALL IS PLACED ON THE ";TEAM$(YARD(1));" ";YA
     RD(2): GOTO 1260
1250  PRINT : PRINT "<<PENALTY ON ";TEAM$(XTM);">>": PRINT "
     HALF THE DISTANCE TO THE GOAL LINE!": PRINT "BALL IS PLACE O
     N THE ";TEAM$(YARD(1));" ";YARD(2)
1260  PRINT : IF KFIRST = 1 THEN  PRINT "FIRST DOWN FOR ";TE
     AM$(AN)
1270  IF ZN = 0 THEN 1290
1280 DOWN = 1:YSTGO = 10:ZN = 0
1290  GOSUB 570: POP : GOTO 1580
1300  FOR I = 1 TO 9: PRINT "*";
1310  FOR J = 1 TO 10:X =  PEEK ( - 16336): NEXT J
1320  NEXT
1330  RETURN
1340  IF OVT = 1 THEN 1400
1350 QTR = 1:TMOUT(1) = 3:TMOUT(2) = 3:INCOMP = 0:WARN = 0:T
     IMSET = 0:ITIME = 900:OVT = 0
1360 SAFETY = 0: FOR I = 1 TO 4:SCR(I,1) = 0:SCR(I,2) = 0: N
     EXT
1370  REM
1380  REM   ***THE KICK OFF***
1390  REM
1400  GOSUB 250: VTAB 24
1410 YARD(1) = OFF:YARD(2) = 40:THIS = 99:ITIME = ITIME - 5:
     HUDDL = 0:KICK = 1
1420  GOSUB 530: GOSUB 570: VTAB 24
1430  PRINT : PRINT TEAM$(OFF);" KICKS OFF AND"
1440 YDL = 50 - (35 +  FN A(18)): IF YDL <  = 0 THEN 1540
1450 IZAL = 20
1460  IF YDL <  = 10 THEN IZAL = IZAL + 5
1470  IF YDL <  = 5 THEN IZAL = IZAL + 5
1480  GOSUB 640:RTURN = 5 +  FN A(IZAL) + (BNUS * 2):ITIME =
      ITIME - 3 - (RTURN / 10): IF RTURN >  = 100 - YDL THEN 4020
1490  IF RTURN + YDL > 50 THEN 1510
1500 YARD(1) = AN:YARD(2) = RTURN + YDL:DOWN = 1:YSTGO = 10:
     GOTO 1520
1510 YARD(1) = OFF:YARD(2) = 50 - (RTURN + YDL - 50):DOWN =
     1:YSTGO = 10: IF YARD(2) < 10 THEN YSTGO = YARD(2)
1520  PRINT : PRINT TEAM$(AN);" RECEIVES THE KICK": PRINT "O
     N THEIR ";YDL;" YARD LINE": PRINT "AND RUNS IT BACK ";RTURN;
     " YARDS": PRINT "TO THE  ";TEAM$(YARD(1));" ";YARD(2)
1530  GOSUB 800: GOSUB 930: GOSUB 530: GOSUB 560: GOSUB 570:
      GOTO 1580
1540 YARD(1) = AN:YARD(2) = 20:DOWN = 1:YSTGO = 10: PRINT :
     PRINT "THE KICK GOES INTO THE END ZONE": PRINT : PRINT "AND
     "TEAM$(AN);" WILL START": PRINT "FROM THEIR OWN 20 YARD LINE
     ": GOSUB 530: GOSUB 570
1550  REM
1560  REM   ***PLAY ANALYSER***
1570  REM
1580  SPEED= ISPD: POKE 34,16: VTAB 24:KICK = 0: IF DOWN = 5
      THEN 3690
1590  GOSUB 460: VTAB 24
1600 ZN = 0
1610  IF AN = 2 THEN 1660
1620  IF DOWN <  > 4 THEN 1660
1630  IF ITIME < 60 AND QTR = 4 AND L1 < L2 THEN 1660
1640  IF YARD(1) = OFF AND YARD(2) <  = 40 THEN 3740
1650  GOTO 3380
```

continued on page 144

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Apple Bowl Football (Cont.)

```
1660 NPLY = NPLY + 1: IF  FN B(QTR) = 0 AND ITIME <  = 120 A
     ND WARN = 0 THEN 1680
1670  GOTO 1690
1680  PRINT : PRINT ">>> TWO MINUTE WARNING <<<"
1690  IF  FN B(QTR) = 0 AND ITIME <  = 120 THEN WARN = 1
1700 NET = (SCR(1,1) + SCR(2,1) + SCR(3,1) + SCR(4,1)) - (SC
     R(1,2) + SCR(2,2) + SCR(3,2) + SCR(4,2))
1710  IF  FN B(QTR) = 0 AND ITIME <  = 120 AND TIMSET = 0 AN
     D NET <  = 0 AND AN = 1 AND HUDDL > 0 THEN 2000
1720  INCOMP = 0:TIMSET = 0: POKE 34,16: IF ITIME <  = 0 THEN
      4180
1730  IF AN = 2 THEN 1910
1740  REM
1750  REM   ***COMPUTER ON OFFENSE***
1760  REM
1770 TYPE =  FN A(100): IF TYPE <  = 25 THEN THIS =  FN A(3)
1780  IF TYPE > 25 THEN THIS =  FN A(4) + 3
1790  IF DOWN = 3 AND YSTGO <  = 3 THEN THIS =  FN A(4) + 3
1800  IF DOWN = 3 AND YSTGO > 4 THEN THIS =  FN A(2) + 1
1810  IF THIS = 3 THEN THIS =  FN A(2) + 1
1820  IF YARD(1) = OFF AND YARD(2) < 15 AND THIS = 1 THEN TH
     IS = 2
1830  IF L1 < L2 AND ITIME <  = 120 AND  FN B(QTR) = 0 THEN
     THIS = 2
1840  IF QTR = 2 AND ITIME < 15 AND YARD(1) = OFF THEN 3740
1850  IF QTR = 4 AND L1 + 3 =  > L2 AND ITIME < 25 AND YARD(
     1) = OFF AND YARD(2) <  = 40 THEN 3740
1860  IF  FN B(QTR) = 0 AND ITIME < 120 AND YARD(1) = OFF AN
     D YARD(2) < 5 THEN THIS = 4
1870  PRINT : PRINT TEAM$(1);" CHOOSES ";PLAY$(THIS): GOTO 2
     060
1880  REM
1890  REM   ***PLAYER ON OFFENSE***
1900  REM
1910  PRINT : INPUT "NEW PLAY: ";HPL$: IF HPL$ <  > "PLAYS"
     THEN 1930
1920  TEXT : HOME : SPEED= 255: GOTO 4780
1930  FOR I = 1 TO 15: IF  MID$ (HPL$,1,2) =  MID$ (PLAY$(I) .
     ,1,2) THEN 1960
1940  NEXT
1950  PRINT : PRINT "ILLEGAL PLAY, TRY AGAIN!": GOTO 1580
1960 THIS = I: IF THIS = 10 THEN 3740
1970  IF THIS = 8 OR THIS = 9 THEN 3390
1980  IF THIS < 11 THEN 2060
1990  IF THIS > 11 THEN 2040
2000 TIMESET = 1:TMOUT(AN) = TMOUT(AN) - 1: IF TMOUT(AN) >
     = 0 THEN 2030
2010  PRINT : IF AN = 2 THEN  PRINT "NO MORE TIME-OUTS LEFT"
2020  GOTO 1580
2030 HUDDL = 0: PRINT : PRINT "TIME-OUT, ";TMOUT(AN);" LEFT
     IN THE HALF": GOTO 1580
2040 THIS = 12:TIMSET = 1
2050  TEXT : HOME : SPEED= 255: GOTO 4380
2060 ITIME = ITIME - HUDDL
2070  IF THIS > 3 THEN DFS =  FN A(4) + 3
2080  IF THIS < 4 THEN DFS =  FN A(3)
2090  IF THIS < 4 THEN 2460
2100 SUB(AN) = 0
2110 SUCC = 1 + ( FN A(2) - 1): IF THIS = DFS THEN SUCC =  -
     2
2120  REM
2130  REM   ***RUN PLAY***
2140  REM
2150 RUSH(AN) = RUSH(AN) + 1:ITIME = (ITIME - 8) -  FN A(10)
     :HUDDL = 20: GOSUB 800: IF FUMBL = 1 THEN 1580
2160  IF DOWN > 2 AND SUCC = 2 THEN SUCC =  - 1
2170  GOSUB 930: GOSUB 640
2180  IF YARD(2) < 10 AND YARD(1) = OFF THEN SUCC = 0:BNUS =
     0
2190  IF DOWN >  = 3 THEN BNUS = 0
2200 KB = KZ(THIS - 3, FN A(3))
2210 GAIN =  FN A(KB) + SUCC + BNUS:YRUSH(AN) = YRUSH(AN) +
     GAIN: IF YARD(1) = AN THEN 2330
2220 YSTGO = YSTGO - GAIN: IF YARD(2) - GAIN > 50 THEN 2240
2230 YARD(2) = YARD(2) - GAIN: GOTO 2250
2240 YARD(1) = AN:YARD(2) = (50 - (YARD(2) - GAIN)) + 50
2250 DOWN = DOWN + 1: IF YARD(2) > 0 THEN 2270
2260 YRUSH(AN) = YRUSH(AN) + YARD(2): GOTO 4030
2270 W$ = W1$: IF GAIN < 0 THEN W$ = W2$
2280  IF GAIN < 0 THEN GAIN =  ABS (GAIN)
2290  PRINT : PRINT "THE PLAY ";W$;" ";GAIN;" YARDS": PRINT
     "TO THE ";TEAM$(YARD(1));" ";YARD(2)
2300  IF YSTGO <  = 0 THEN 3660
2310  GOSUB 570
2320  GOTO 1580
2330 DOWN = DOWN + 1:YSTGO = YSTGO - GAIN: IF YARD(2) + GAIN
     <  = 50 THEN 2370
2340 YARD(1) = OFF:YARD(2) = 50 - (GAIN + YARD(2) - 50): IF
     YARD(2) > 0 THEN 2360
2350 YRUSH(AN) = YRUSH(AN) + YARD(2): GOTO 4030
2360  GOTO 2380
2370 YARD(2) = YARD(2) + GAIN: IF YARD(2) <  = 0 THEN 4030
2380 W$ = W1$: IF GAIN < 0 THEN W$ = W2$
2390  IF GAIN < 0 THEN GAIN =  ABS (GAIN)
2400  PRINT : PRINT "THE PLAY ";W$;" ";GAIN;" YARDS": PRINT
     "TO THE ";TEAM$(YARD(1));" ";YARD(2): IF YSTGO <  = 0 THEN 3
     660
2410  GOSUB 570
2420  GOTO 1580
2430  REM
2440  REM   ***PASS PLAY***
2450  REM
2460 PASS =  FN A(100) - SUB(AN):SUB(AN) = SUB(AN) + 1
2470 PZ = 0
2480  IF DOWN > 2 AND THIS = 1 THEN PZ = PZ + 2
2490  IF DOWN = 4 THEN PZ = PZ + 5
2500 PASS(AN) = PASS(AN) + 1: IF PASS > 5 THEN 2640
2510  GOSUB 930
2520  REM
2530  REM   ***PASSER THROWN FOR A LOSS***
2540  REM
2550 ITIME = ITIME - 8 -  FN A(9):HUDDL = 20:LOSS =  - 3 -
     FN A(8):RPASS(AN) = RPASS(AN) + LOSS:DOWN = DOWN + 1:YSTGO =
      YSTGO - LOSS
2560 VSAK(OFF) = VSAK(OFF) + 1
2570  IF YARD(1) = OFF THEN 2590
2580 YARD(2) = YARD(2) + LOSS: GOTO 2620
2590  IF YARD(2) - LOSS > 50 THEN 2610
2600 YARD(2) = YARD(2) - LOSS: GOTO 2620
2610 YARD(1) = AN:YARD(2) = 50 - (YARD(2) - LOSS - 50)
2620  IF YARD(2) <  = 0 THEN 4140
2630 ALOS =  ABS (LOSS): PRINT : PRINT TEAM$(AN);" PASSER IS
      THROWN FOR A ": PRINT ALOS;" YARD LOSS TO THE ";TEAM$(YARD(
     1));" ";YARD(2): GOSUB 640: GOSUB 570: GOTO 1580
2640  IF THIS = 1 THEN TSS = 18 +  FN A(25)
2650  IF THIS = 2 THEN TSS =  FN A(7) + 3
2660  IF THIS = 3 THEN TSS =  - 3
2670  IF PASS > 9 + PZ THEN 3000
2680  REM
2690  REM   ***INTERCEPTED***
2700  REM
2710 ZN = 1
2720 ITIME = ITIME - 7 -  FN A(10):NENT(OFF) = NENT(OFF) + 1
     :HUDDL = 20:SET = AN:AN = OFF:OFF = SET: GOSUB 640:RNBK = 5
     +  FN A(30) + BNUS:TXIS = THIS:THIS = 0
2730  IF YARD(1) = OFF THEN 2790
2740  IF TXIS = 3 AND YARD(2) >  = 47 THEN 2780
2750 YARD(2) = YARD(2) - TSS: IF YARD(2) > 0 THEN 2820
2760  PRINT : PRINT TEAM$(OFF);" PASS INTERCEPTED BY": PRINT
      TEAM$(AN);" IN THE END ZONE!": PRINT "AND THEY WILL START F
     ROM THEIR OWN 20."
2770 YARD(1) = AN:YARD(2) = 20:DOWN = 1:YSTGO = 10: GOSUB 53
     0: GOSUB 570: GOTO 1580
2780 YARD(2) = 50 - (YARD(2) - TSS - 50):YARD(1) = OFF: GOTO
      2820
2790  IF YARD(2) + TSS > 50 THEN 2810
2800 YARD(2) = YARD(2) + TSS: GOTO 2820
2810 YARD(1) = AN:YARD(2) = 50 - (YARD(2) + TSS - 50)
2820  PRINT : PRINT TEAM$(OFF);" PASS INTERCEPTED BY": PRINT
      TEAM$(AN);" AT THE ";TEAM$(YARD(1));" ";YARD(2)
2830  IF YARD(1) = AN THEN 2850
2840 YARD(2) = YARD(2) - RNBK: GOTO 2880
2850  IF YARD(2) + RNBK > 50 THEN 2870
2860 YARD(2) = YARD(2) + RNBK: GOTO 2880
2870 YARD(1) = OFF:YARD(2) = 50 - (YARD(2) + RNBK - 50)
2880  IF YARD(2) > 0 THEN  PRINT "AND RUN BACK ";RNBK;" YARD
     S": PRINT "TO THE ";TEAM$(YARD(1));" ";YARD(2)
2890  GOTO 2930
2900  GOSUB 800: IF YARD(2) > 0 AND FUMBL <  > 1 THEN 2920
2910  GOSUB 530: GOSUB 570: GOTO 1580
2920  IF YARD(2) > 0 THEN  GOSUB 930
2930  IF YARD(2) <  = 0 AND YARD(1) = OFF THEN  PRINT "AND R
     UN BACK FOR A"
2940  IF YARD(2) <  = 0 AND YARD(1) = OFF THEN 4030
2950 FIRST(AN) = FIRST(AN) - 1: IF YARD(2) > 0 THEN 3660
2960 YARD(1) = AN:YARD(2) = 20: PRINT "AND THEY START AT THE
     IR 20": GOTO 3660
2970  REM
2980  REM   ***DETERMINES IF PASS COMPLETE***
2990  REM
3000  IF THIS > 1 THEN 3040
3010 COMPL = 67 + PZ
3020  IF DFS = 1 THEN COMPL = 79 + PZ
3030  GOTO 3080
3040  IF THIS > 2 THEN 3070
3050 COMPL = 37: IF DFS = 2 THEN COMPL = 59
3060  GOTO 3080
3070 COMPL = 27: IF DFS = 3 THEN COMPL = 54
3080  IF PASS > COMPL THEN 3160
3090  REM
3100  REM   ***INCOMPLETE***
3110  REM
3120 INCOMP = 1:ITIME = ITIME - 3 -  FN A(7):HUDDL = 0:DOWN
     = DOWN + 1: PRINT : PRINT TEAM$(AN);" PASS INCOMPLETE": GOSU
     B 570: GOTO 1580
3130  REM
3140  REM   ***COMPLETE***
3150  REM
3160  IF THIS = 1 THEN GAIN = TSS +  FN A(20)
3170  IF THIS = 2 THEN GAIN = TSS +  FN A(8)
3180  IF THIS = 3 THEN GAIN = TSS +  FN A(15)
3190  GOSUB 640:XBN = BNUS * 2 - 10: IF XBN > 0 THEN GAIN =
     GAIN + XBN
3200 COMP(AN) = COMP(AN) + 1:ITIME = (ITIME - 7) -  FN A(10)
     :HUDDL = 20:RPASS(AN) = RPASS(AN) + GAIN
3210  IF YARD(1) = OFF THEN 3260
3220  IF YARD(2) + GAIN > 50 THEN 3240
3230 YARD(2) = YARD(2) + GAIN: GOTO 3280
3240 YARD(1) = OFF:YARD(2) = 50 - (YARD(2) + GAIN - 50): IF
     YARD(2) > 0 THEN 3280
3250  PRINT : PRINT TEAM$(AN);" PASS COMPLETE!!": GOTO 4030
3260 YARD(2) = YARD(2) - GAIN: IF YARD(2) > 0 THEN 3280
3270  GOTO 3250
3280 W$ = W1$: IF GAIN < 0 THEN W$ = W2$
3290  IF GAIN < 0 THEN GAIN =  ABS (GAIN)
3300  PRINT : PRINT TEAM$(AN);" PASS COMPLETE!!": PRINT "PLA
     Y ";W$;" ";GAIN;" YARDS": PRINT "TO THE ";TEAM$(YARD(1));" "
     ;YARD(2)
3310  IF YARD(2) <  = 0 THEN 4030
3320  IF W$ = W2$ THEN GAIN =  - GAIN
3330 YSTGO = YSTGO - GAIN: IF YSTGO <  = 0 THEN 3660
3340 DOWN = DOWN + 1: GOSUB 640: GOSUB 570: GOTO 1580
3350  REM
3360  REM   ***PUNT OR QUICK KICK***
3370  REM
3380 THIS = 8
3390  GOSUB 930:LNGTH =  FN A(25) + 28 + SAFETY: IF DOWN = 4
     AND THIS = 9 THEN THIS = 8
3400  IF SAFETY > 0 THEN 3420
3410 PUNT(AN) = PUNT(AN) + 1:YPUNT(AN) = YPUNT(AN) + LNGTH
3420 SAFETY = 0: IF THIS = 9 THEN LNGTH = LNGTH + 2 +  FN A(
     4)
```

continued on page 150

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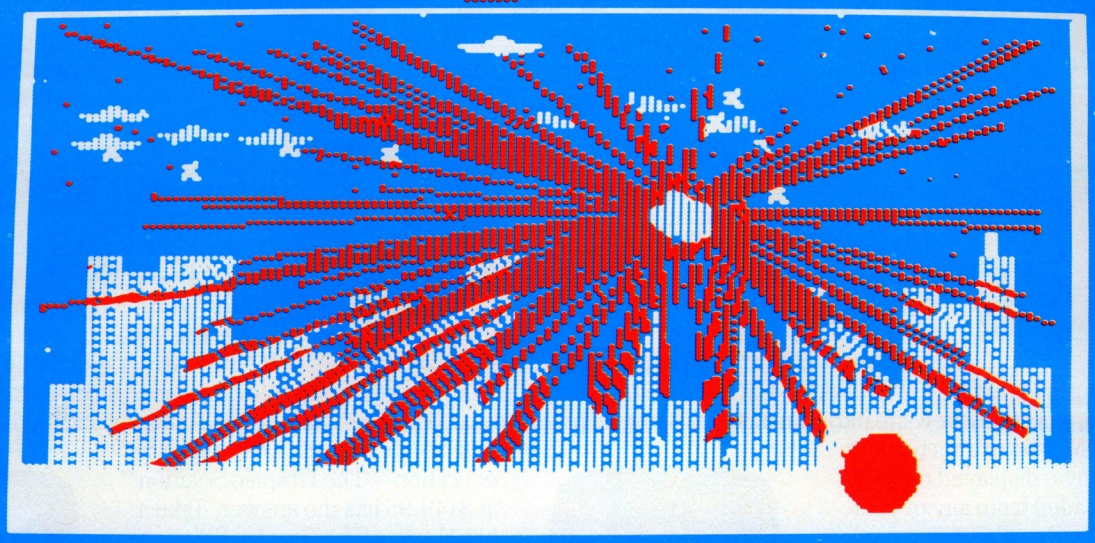

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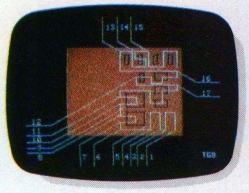

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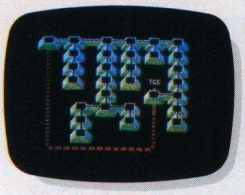

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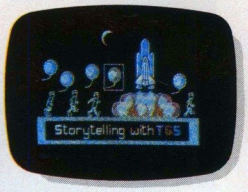

The Graphic Solution requires a 48K Apple II with ROM Applesoft and DOS 3.3.

See your local dealer or send $10.00 for a demonstration diskette to:

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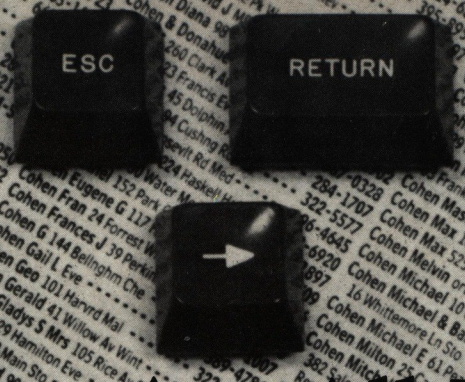
TeleText



Are All You Need!

That's right. Three simple keys are all it takes to turn your Apple II* into the most complete, versatile, and easy-to-use communications system you can buy.

When you load the TeleText disk, your screen shows:

```
TELETEXT
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COMMUNICATIONS SYSTEM
FILING SYSTEM
EDITING SYSTEM
PRINTING SYSTEM
ANSWERING SYSTEM
CONFIGURATION SYSTEM
MACRO EDITOR
PHONE NUMBER EDITOR
QUIT PROGRAM
USE → AND ← TO MOVE BAR
PRESS RETURN TO SELECT
```

The TeleText *"Magic Bar"* highlights your active option, and all you do to move the *Magic Bar* is press the Right and Left Arrow keys. When the bar is positioned over the function you want, Press Return and you're all set—no complicated codes or procedures to worry about.

Let's select the Communications System. Press Return to see!

```
COMMUNICATIONS SYSTEM
PHONE NUMBER :
CONNECTED : NO
BAUD RATE : 300
DATA FORMAT : 8N1
LOCAL ECHO : OFF
MACRO FILE : 0
PAUSE KEY : CTRL-S
RESUME KEY : CTRL-Q
AUTO DOWNLOAD : OFF
PROMPT SYMBOL : ?
DELAY FACTOR : 0
HANDSHAKE : OFF
FILTER : ON
RETURN TO MAIN COMMAND MENU
COMMENCE COMMUNICATION
MODIFY COMMUNICATION OPTIONS
SAVE CONFIGURATION TO DISK
```

To enter the desired phone number, simply Select the MODIFY COMMUNICATION OPTION and the Magic Bar will move up to PHONE NUMBER. Type in your desired PHONE NUMBER (or choose a phone number with one keystroke from the Directory that you can construct) and you're ready to communicate with Information Services, computer Bulletin Boards, or send your files to another computer.

But What Text do you send? Well, you can transmit *Basic Programs, Text Files, Binary Files,* and even *Pascal Files!* Or you can create *your own text* by using Teletext's powerful built-in *Editor.*

Just return to the MAIN COMMAND MENU and use the *Magic Bar* to select the *EDITING SYSTEM.*

Now your screen clears and shows:

```
EDITING SYSTEM
PRESS <CTRL-X> FOR MAIN MENU
:A
1 Here's your Message being typed in,
  ready for transmission.
2 Pressing the A Key alerted Teletext
  that you wanted to add a message
  to be sent.
3 You could also have loaded a Basic
  Program (captured as a Text File)
  to send.
4 Teletext keeps your text words
  intact on the screen.
5 And TeleText has a complete, built-in
  line-oriented Text Editor.
6 You can Insert/Delete/and Change
  Text in a flash.
7 It handles Control Characters too!
```

When you're finished, pressing CTRL-X will return you to the Main Menu.

Using the TeleText *Magic Bar,* select the *COMMUNICATIONS SYSTEM* and the *COMMENCE COMMUNICATIONS* Option. The phone number is automatically dialed and the screen displays:

```
ESC  1    2    3    4    5    6    7
     SHIFT BRK  SND  MC1  MC2  MEM  XIT
```

You press the *ESC* key and the *3* Key and out goes your message!

What could be easier?

TeleText lets you transmit any *sequence* of characters you specify by just pressing two keys. For example, if you use any of the information services such as *The Source* or *CompuServe,* you can store the *sign-on sequence* on the Teletext disk and then use it over and over.

If you're *Receiving* Text and the communications area fills up, TeleText automatically saves the message to Disk.

For experienced Communications Programmers, TeleText has all the controls and advanced features you could want. • Complete Configuration Control. • Upload/Download. • Remote Control. • File Management. • Auto Receive Multiple Messages. • 40–80 Column Display (with Videx Videoterm and SoftSwitch.) • Phone Number Directory Editor. • Capacity for up to 9 Macro Files with Macro-Editor. • Lower Case display with Adapter or Videx Board. • Shift Key Option. And more.

*Teletext requires a 48K Apple II Plus with 1 disk drive and either: the Hayes Micromodem II, the Apple-Cat II by Novation, or any acoustic modem with an Apple Communications Card.

On Price/Performance, TeleText really comes into its own. At $79.95, it's a winner!

TeleText is available through many Apple Dealers. If your Dealer does not yet stock TeleText, send or phone your order to Micro-SPARC, Inc., Systems Division, PO Box 639, Lincoln, MA 01773. (617) 259-9710. (Add $1.50 for shipping and handling. MA residents add 5% sales tax). We accept Visa and Mastercharge.

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Apple Bowl Football (Cont.)

```
3430 HUDDL = 0: IF LNGTH + YARD(2) > 50 AND YARD(1) = AN THE
     N 3490
3440  IF YARD(1) = AN THEN 3480
3450 YARD(2) = YARD(2) - LNGTH: IF YARD(2) <  = 0 THEN 3470
3460  GOTO 3500
3470 SET = AN:AN = OFF:OFF = SET:ITIME = ITIME -  FN A(5): G
     OTO 1540
3480 YARD(2) = YARD(2) + LNGTH: GOTO 3500
3490 YARD(1) = OFF:YARD(2) = 50 - (YARD(2) + LNGTH - 50): IF
      YARD(2) <  = 0 THEN 3470
3500  PRINT :SET = AN:AN = OFF:OFF = SET: IF THIS = 9 THEN
     PRINT TEAM$(OFF);" QUICK KICKS ";LNGTH;" YARDS": PRINT "TO T
     HE ";TEAM$(YARD(1));" ";YARD(2)
3510  PRINT : IF THIS = 8 THEN  PRINT TEAM$(OFF);" PUNTS ";L
     NGTH;" YARDS": PRINT "TO THE ";TEAM$(YARD(1));" ";YARD(2)
3520  GOSUB 640:RTURN =  FN A(12) + BNUS: IF THIS = 9 THEN R
     TURN = RTURN - 2 -  FN A(3)
3530  IF RTURN < 0 THEN RTURN = 0
3540 ITIME = (ITIME - 7) -  FN A(10): IF RTURN + YARD(2) > 5
     0 AND YARD(1) = AN THEN 3610
3550  IF YARD(1) = AN THEN YARD(2) = YARD(2) + RTURN
3560  IF YARD(1) = OFF THEN YARD(2) = YARD(2) - RTURN
3570  PRINT : IF YARD(2) <  = 0 THEN  PRINT TEAM$(AN);" RETU
     RNS IT FOR A  "
3580  PRINT : IF YARD(2) <  = 0 THEN 4030
3590  PRINT : PRINT TEAM$(AN);" RETURNS IT ";RTURN;" YARDS":
      PRINT "TO THE ";TEAM$(YARD(1));" ";YARD(2)
3600  GOSUB 640:FIRST(AN) = FIRST(AN) - 1: GOTO 3660
3610 YARD(1) = OFF:YARD(2) = 50 - (YARD(2) + RTURN - 50): IF
      YARD(2) <  = 0 THEN 3570
3620  GOTO 3590
3630  REM
3640  REM   ***FIRST DOWN***
3650  REM
3660 DOWN = 1:FIRST(AN) = FIRST(AN) + 1:YSTGO = 10
3670  IF YARD(1) = OFF AND YARD(2) < 10 THEN YSTGO = YARD(2)
3680  PRINT : PRINT "FIRST DOWN ON THE ";TEAM$(YARD(1));" ";
     YARD(2): GOSUB 530: GOSUB 570: GOSUB 580: GOTO 1580
3690  PRINT : PRINT "BALL TURNS OVER TO ";TEAM$(OFF): PRINT
     "ON DOWNS AT THE ";TEAM$(YARD(1));" ";YARD(2)
3700 HUDDL = 0:SET = AN:AN = OFF:OFF = SET: GOTO 3660
3710  REM
3720  REM   ***FIELD GOAL ATTEMPT***
3730  REM
3740 FLD(AN) = FLD(AN) + 1
3750  IF YARD(2) > 0 THEN PROB = 90
3760  IF YARD(2) > 20 THEN PROB = 80
3770  IF YARD(2) > 30 THEN PROB = 45
3780  IF YARD(2) > 40 THEN PROB = 25
3790  IF YARD(1) = AN AND YARD(2) > 40 THEN PROB = 10
3800  IF YARD(1) = AN AND YARD(2) < 40 THEN PROB = 2
3810  IF  FN A(100) < PROB THEN 3920
3820  PRINT : PRINT "FIELD GOAL ATTEMPT FAILS,"
3830 SET = AN:AN = OFF:OFF = SET: IF YARD(1) = OFF THEN 3880
3840  IF YARD(2) < 20 THEN 3860
3850  PRINT : PRINT TEAM$(AN);" START FROM THE ";TEAM$(YARD(
     1));" ";YARD(2):YARD(1) = AN:DOWN = 1:YSTGO = 10:HUDDL = 0:
     FOR I = 1 TO 500: NEXT : GOSUB 530: GOSUB 570: GOTO 1580
3860  PRINT : PRINT TEAM$(AN);" START FROM THEIR OWN 20"
3870 YARD(1) = AN:YARD(2) = 20:DOWN = 1:YSTGO = 10:HUDDL = 0
     : GOSUB 530: GOSUB 570: GOTO 1580
3880 LNGTH = 39 +  FN A(10):HUDDL = 0: PRINT : PRINT "THE KI
     CK IS SHORT!"
3890  IF LNGTH + YARD(2) > 50 THEN 3910
3900 YARD(2) = YARD(2) + LNGTH: GOTO 3520
3910 YARD(1) = AN:YARD(2) = 50 - (YARD(2) + LNGTH - 50): GOT
     O 3520
3920  SPEED= 255:MADE(AN) = MADE(AN) + 1: FLASH : PRINT : PR
     INT "*** FIELD GOAL *** FOR ";TEAM$(AN): NORMAL : SPEED= ISP
     D
3930 SCR(QTR,AN) = SCR(QTR,AN) + 3
3940 L1 = 0:L2 = 0: FOR I = 1 TO QTR:L1 = L1 + SCR(I,1):L2 =
      L2 + SCR(I,2): NEXT : GOSUB 560
3950 SET = AN:AN = OFF:OFF = SET
3960  IF OVT = 1 THEN 4180
3970  IF ITIME < 0 AND  FN B(QTR) = 0 THEN 4180
3980  GOTO 1410
3990  REM
4000  REM   ***TOUCHDOWN***
4010  REM
4020  PRINT TEAM$(AN);" RECEIVES THE KICK": PRINT "ON THEIR
     ";YDL;" YARD LINE": PRINT "AND RUNS IT BACK FOR A"
4030  SPEED= 255: FLASH : PRINT : PRINT "******* TOUCHDOWN *
     ****** FOR ";TEAM$(AN): NORMAL : SPEED= ISPD
4040  IF THIS >  = 1 AND THIS < 4 THEN RPASS(AN) = RPASS(AN)
      + YARD(2)
4050  IF THIS >  = 4 AND THIS < 7 THEN YRUSH(AN) = YRUSH(AN)
      + YARD(2)
4060  IF THIS > 0 THEN FIRST(AN) = FIRST(AN) + 1
4070 SCR(QTR,AN) = SCR(QTR,AN) + 6:HUDDL = 0: IF  FN A(100)
     < 3 THEN 4090
4080 SCR(QTR,AN) = SCR(QTR,AN) + 1: PRINT : PRINT "POINT AFT
     ER GOOD!": GOTO 4100
4090  PRINT : PRINT "POINT AFTER FAILED"
4100  GOTO 3940
4110  REM
4120  REM     ***SAFETY***
4130  REM
4140 SCR(QTR,OFF) = SCR(QTR,OFF) + 2: PRINT : PRINT TEAM$(AN
     );" IS CAUGHT FOR A SAFETY!"
4150 SAFETY = 20:L1 = 0:L2 = 0: FOR I = 1 TO QTR:L1 = L1 + S
     CR(I,1):L2 = L2 + SCR(I,2): NEXT
4160  GOSUB 560: IF OVT = 1 THEN 4180
4170 ITIME = (ITIME - 7) -  FN A(5):YARD(1) = AN:YARD(2) = 2
     0: GOTO 3380
4180 QTR = QTR + 1:OQTR = QTR - 1:THIS = 99:ITIME = 60 * 15
4190  IF QTR = 5 THEN 4300
4200  IF QTR = 3 THEN 4220
4210  TEXT : HOME : VTAB 12: GOSUB 1300: PRINT "  END OF QUA
     RTER ";OQTR;"  ";: GOSUB 1300: FOR I = 1 TO 1000: NEXT : GOS
     UB 250: GOTO 1580
4220  TEXT : HOME : GOSUB 1300: PRINT "END OF THE FIRST HALF
     ";: GOSUB 1300: PRINT :TMOUT(1) = 3:TMOUT(2) = 3:WARN = 0
4230  IF BEGIN = 2 THEN 4250
4240 AN = 2:OFF = 1: GOTO 4260
4250 AN = 1:OFF = 2
4260 L1 = SCR(1,1) + SCR(2,1):L2 = SCR(1,2) + SCR(2,2)
4270  PRINT : PRINT "SCORE AT HALF TIME": PRINT TEAM$(1); TA
     B( 13);SCR(1,1); TAB( 17);SCR(2,1); TAB( 21);"-"; TAB( 25);L
     1
4280  PRINT TEAM$(2); TAB( 13);SCR(1,2); TAB( 17);SCR(2,2);
     TAB( 21);"-"; TAB( 25);L2
4290  PRINT : PRINT "STATISTICS AT HALFTIME": GOTO 4380
4300  TEXT : HOME : HTAB 5: GOSUB 1300: PRINT "  BANG!!  ";:
      GOSUB 1300: PRINT : PRINT  TAB( 6);"THAT'S THE END OF THE G
     AME!"
4310 L1 = SCR(1,1) + SCR(2,1) + SCR(3,1) + SCR(4,1):L2 = SCR
     (1,2) + SCR(2,2) + SCR(3,2) + SCR(4,2)
4320  PRINT : PRINT "FINAL SCORE AT THE FOOTBALL BOWL": PRIN
     T TEAM$(1); TAB( 13);SCR(1,1); TAB( 17);SCR(2,1); TAB( 21);S
     CR(3,1); TAB( 25);SCR(4,1); TAB( 29);"-"; TAB( 33);L1
4330  PRINT TEAM$(2); TAB( 13);SCR(1,2); TAB( 17);SCR(2,2);
     TAB( 21);SCR(3,2); TAB( 25);SCR(4,2); TAB( 29);"-"; TAB( 33)
     ;L2
4340  REM
4350  REM    ***STATISTICS***
4360  REM
4370  PRINT : PRINT "FINAL STATISTICS"
4380 ZPLAY(1) = RUSH(1) + PASS(1) + LOSS(1):ZPLAY(2) = RUSH(
     2) + PASS(2) + LOSS(2)
4390 T1 = YRUSH(1) + RPASS(1):T2 = YRUSH(2) + RPASS(2):X1R =
      0:X2R = 0:P1X = 0:P2X = 0
4400  IF RUSH(1) > 0 THEN X1R = YRUSH(1) / RUSH(1)
4410  IF RUSH(2) > 0 THEN X2R = YRUSH(2) / RUSH(2)
4420  IF PASS(1) > 0 THEN P1X = RPASS(1) / PASS(1)
4430  IF PASS(2) > 0 THEN P2X = RPASS(2) / PASS(2)
4440 XPUNT(1) = 0:XPUNT(2) = 0: IF PUNT(1) > 0 THEN XPUNT(1)
      = YPUNT(1) / PUNT(1)
4450  IF PUNT(2) > 0 THEN XPUNT(2) = YPUNT(2) / PUNT(2)
4460  PRINT  TAB( 17);TEAM$(1); TAB( 28);TEAM$(2)
4470  PRINT "NO PLAYS"; TAB( 18);ZPLAY(1); TAB( 29);ZPLAY(2)
4480  PRINT "FIRST DOWNS"; TAB( 18);FIRST(1); TAB( 29);FIRST
     (2)
4490  PRINT "YARDS RUSH"; TAB( 18);YRUSH(1); TAB( 29);YRUSH(
     2)
4500  PRINT "AVER RUSH"; TAB( 18) FN Z(X1R); TAB( 29); FN Z(
     X2R)
4510  PRINT "COMP/ATT"; TAB( 18);COMP(1);"/";PASS(1); TAB( 2
     9);COMP(2);"/";PASS(2)
4520  PRINT "YARDS PASS"; TAB( 18);RPASS(1); TAB( 29);RPASS(
     2)
4530  PRINT "AVER PASS"; TAB( 18) FN Z(P1X); TAB( 29); FN Z(
     P2X)
4540  PRINT "Q.B. SACKS"; TAB( 18);VSAK(1); TAB( 29);VSAK(2)
4550  PRINT "NO OF PUNTS"; TAB( 18);PUNT(1); TAB( 29);PUNT(2
     )
4560  PRINT "AVER YARDS/PUNT"; TAB( 18); FN Z(XPUNT(1)); TAB
     ( 29); FN Z(XPUNT(2))
4570  PRINT "INTERCEPTIONS"; TAB( 18);NENT(1); TAB( 29);NENT
     (2)
4580  PRINT "FUMBL/RECOV"; TAB( 18);FUM(1);"/";RECO(1); TAB(
     29);FUM(2);"/";RECO(2)
4590  PRINT "TOTAL YARDS"; TAB( 18);T1; TAB( 29);T2
4600  PRINT "FIELD GOALS"; TAB( 18);MADE(1);"-";FLD(1); TAB(
     29);MADE(2);"-";FLD(2)
4610  PRINT "PENALTIES"; TAB( 18);NPEN(1);"-";PPEN(1); TAB(
     29);NPEN(2);"-";PPEN(2)
4620  IF THIS <  > 12 THEN 4650
4630  PRINT : PRINT : SPEED= ISPD: PRINT "HIT ANY KEY TO CON
     TINUE ";: GET A$
4640  GOSUB 250: GOTO 1580
4650  IF OQTR <  > 2 THEN 4670
4660  PRINT : PRINT : PRINT "HIT ANY KEY TO CONTINUE ";: GET
      A$: GOTO 1400
4670  IF L1 <  > L2 THEN 4740
4680  FOR I = 1 TO 2800: NEXT : HOME : VTAB 5: HTAB 4: PRINT
      "* * * *  O V E R T I M E  * * * *": VTAB 9: HTAB 5: PRINT
     "THE SCORE IS TIED AND THE GAME"
4690  PRINT : PRINT "MOVES TO A FIFTEEN MINUTE SUDDEN DEATH"
     : PRINT : PPINT "OVERTIME PERIOD.  YOU HAVE TWO TIMEOUTS.":
     PRINT : PRINT "         G O O D   L U C K"
4700  FOR I = 1 TO 3000: NEXT
4710 ITIME = 900:OQTR = OQTR - 1:OVT = 1:QTR = QTR - 1
4720 WARN = 0:TMOUT(1) = 2:TMOUT(2) = 2:TIMSET = 0
4730  GOTO 4770
4740  POKE 9,Z1: CLEAR :ALPHA = 1:Z1 =  PEEK (9)
4750  PRINT : INPUT "DO YOU WANT TO PLAY AGAIN? ";ANS$: IF
     MID$ (ANS$,1,1) = "Y" THEN 110
4760  SPEED= 255: END
4770  TEXT : HOME
4780  PRINT "****************************************
          FOOTBALL 3.0              **                BY
                **          PRESTON R BLACK MD          **
             AND                  **";
4790  PRINT "**          RICHARD I MORRIS JR          **
                                  **  COPYRIGHT 1982 BY MICRO-
     SPARC, INC. ****************************************"
4800  IF HPL$ = "PLAYS" THEN 4930
4810  POKE 34,10
4820  IF ALPHA = 1 THEN 5090
4830  IF OVT = 1 THEN 5100
4840  POKE 34,10: INPUT "DO YOU WANT INSTRUCTIONS? ";ANS$: I
     F  MID$ (ANS$,1,1) = "Y" THEN 4860
4850  GOTO 5030
4860  PRINT "FOOTBALL 3.0 IS AN INTERACTIVE STRATEGY GAME WH
     ICH ALLOWS YOU TO PIT YOUR SKILL AS THE COACH OF A FOOTBALL
     TEAM AGAINST THE APPLE II COMPUTER.  YOU CALL EACH  PLAY AS
      YOU MARCH YOUR TEAM UP AND DOWN"
4870  PRINT "THE FIELD. YOU HAVE YOUR CHOICE OF      THREE P
     ASSING PLAYS AND FIVE RUNNING    PLAYS.  YOU ALSO HAVE A COM
     PLETE KICK-  ING GAME WHICH INCLUDES PUNTS, QUICK    KICKS A
     ND FIELD GOAL ATTEMPTS.  BUT"
```

```
4880  PRINT "BEWARE!  IF YOU TRY A FIELD GOAL FROM   OUTSIDE
      THE TWENTY YARD LINE, THE BALL  WILL BE PLACED THERE IF YOU
      MISS. THERE ARE GAME BREAKING LONG RUNS AND LONG";: GET A$
4890  HOME
4900  PRINT "BOMBS. THERE ARE FUMBLES, INTERCEPTIONS,QUARTER
      BACK SACKS, AND SAFETIES. THERE  ARE DRIVE STOPPING PENALTIE
      S. YOU CAN   RUN YOUR TWO MINUTE DRILL BY USING YOUR TIME-OU
      TS WISELY. WHEN THE APPLE IS ON"
4910  PRINT "OFFENSE IT WILL CHOOSE PLAYS AUTOMATICALLY.  WH
      EN YOU ARE ON OFFENSE YOU WILL BEPROMPTED BY 'NEW PLAY' AND
      YOU CAN PICK ONE OF FIFTEEN OPTIONS.": PRINT : PRINT "THE CU
      RRENT PLAYS ARE:";: GET A$
4920  PRINT
4930  POKE 34,9: PRINT : SPEED= 255
4940  PRINT  TAB( 5);"LPASS"; TAB( 11);"- LONG PASSING PLAY"
      : PRINT  TAB( 5);"SPASS"; TAB( 11);"- SHORT PASSING PLAY"
4950  PRINT  TAB( 5);"SCRN"; TAB( 11);"- SCREEN PASS"
4960  PRINT  TAB( 5);"MRUN"; TAB( 11)"- RUN UP THE MIDDLE":
      PRINT  TAB( 5);"OTRUN"; TAB( 11);"- OFF TACKLE RUN"
4970  PRINT  TAB( 5);"DRAW"; TAB( 11);"- DRAW PLAY": PRINT
      TAB( 5);"SWEEP"; TAB( 11);"- A SWEEP"
4980  PRINT  TAB( 5);"PUNT"; TAB( 11);"- A PUNT"
4990  PRINT  TAB( 5);"QKKIK"; TAB( 11);"- A QUICK KICK": PRI
      NT  TAB( 5);"FLDGL"; TAB( 11);"- A FIELD GOAL ATTEMPT"
5000  PRINT  TAB( 5);"STAT"; TAB( 11);"- LIST OF CURRENT STA
      TISTICS": PRINT  TAB( 5);"TMOUT"; TAB( 11);"- TAKES A TIME-O
      UT": PRINT  TAB( 5);"PLAYS"; TAB( 11);"- LIST CURRENT PLAYS"
      ; TAB( 40);: GET A$
5010  HOME : POKE 34,10: IF HPL$ >  < "PLAYS" THEN 5030
5020  GOSUB 250: GOTO 1580
5030  HOME : PRINT "IN ORDER TO INITIALIZE THE RANDOM": PRIN
      T "NUMBER GENERATOR, PLEASE ENTER A ": INPUT "A NUMBER BETWE
      EN 1 AND 100: ";NN
5040  IF NN < 1 OR NN > 100 THEN 5030
5050  FOR I = 0 TO NN:X =  RND (1): NEXT
5060  PRINT : PRINT "PLEASE ENTER A DISPLAY SPEED": PRINT "F
      ROM 1 (VERY SLOW TYPING)": INPUT "TO 5 (VERY FAST TYPING): "
      ;Z1
5070  IF Z1 >  = 1 AND Z1 <  = 5 THEN 5090
5080  VTAB 14: GOTO 5060
5090  PRINT : INPUT "WHAT IS THE NAME OF YOUR TEAM? ";TEAM$(
      2): PRINT : INPUT "WHAT TEAM IS THE APPLE II? ";TEAM$(1)
5100  HOME : PRINT "IT IS NOW TIME FLIP THE COIN": PRINT "AS
      THE CAPTAIN OF ";TEAM$(2);" YOU": PRINT "GET TO CALL IT ";:
      INPUT "HEADS OR TAILS: ";ACHOIC$
5110 FLIP =  FN A(2): IF FLIP = 1 THEN CHOICE$ = "H"
5120  IF FLIP = 2 THEN CHOICE$ = "T"
5130  IF  LEFT$ (ACHOIC$,1) = CHOICE$ THEN 5150
5140 AN = 1:OFF = 2:BEGIN = AN: PRINT : PRINT "SORRY ";TEAM$
      (2);" BUT ";TEAM$(1): PRINT "WINS THE TOSS AND WILL RECEIVE!
      ": GOTO 5160
5150 AN = 2:OFF = 1:BEGIN = AN: PRINT TEAM$(2);" WINS THE TO
      SS": PRINT "AND WILL RECEIVE!"
5160  FOR I = 1 TO 1000: NEXT :ISPD = 50 * Z1 + 5: SPEED= IS
      PD: GOTO 1340
```


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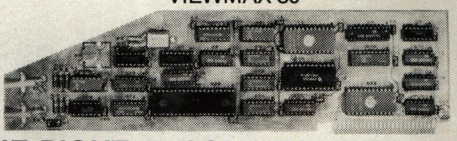

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TOUGH TFILE Reformatter

by Hal Clark
On-Going Ideas
RD #1 Box 810
Starksboro, VT 05487

The TFILE-Reformatter (T/R) allows the ability to automatically change the width of a TFILE created by the Nibble T.O.U.G.H. text editor (Nibble Express Volume 1).

The reformatter will adjust the margins of any standard text file as long as the following conditions are met:

1. **The file must contain as the first entry the maximum number of characters in a line.**
2. **The second entry is the number of lines in the file.**
3. **The third entry is the number of spaces in a tab.**
4. **The text of the file is in the following format:**
   a. **A quotation mark at the beginning of each line.**
   b. **No more than the maximum line length of ASCII characters.**
   c. **An ASCII carriage return (13).**

THE DIFFERENCE

The major difference between the output of this program and TOUGH is in the **line ending technique**. TOUGH produces a flush right margin (justified) and T/R produces a ragged right margin. The ragged margin is produced by **ending the line at the last space before the margin**. The ragged right margin was selected because:

1. **It is easier to edit the line unjustified.**
2. **Most letters and other documents do not require justified margins.**
3. **Most word processors produce ragged right margins as their standard output.**

If your work requires justified margins, then just insert the justify routine from TOUGH after line 560.

The program also **removes hyphens** at the end of the input line **and any excess spaces** in the middle of a line.

OPERATION

The program begins by clearing the screen, printing the heading, and setting the scroll window. Variables are initialized next in preparation for the file input.

T/R requests the file name to reformat (**do not enter the prefix "TFILE-"**); if you don't remember the name, press RETURN and the catalog will be displayed. Once the file name is entered, the file is opened and the **number of lines**, **line length**, and **tab size** is read in. The current line length is printed and you now enter the new line length.

The screen is now cleared and the run-time screen is shown. This screen displays the **file name**, **old** and **new line lengths**, and the **total number of lines** followed by the input and output line numbers for the lines in process.

The line numbers will be updated until the file is empty or until you press **'A'** to abort the reformatting.

If you choose to abort the reformatting, you will be given the chance to save the text output so far and then you will be given the chance to restart or end the program.

The file name used for the output file is:

TFILE-NEW filename

where filename is the original file name.

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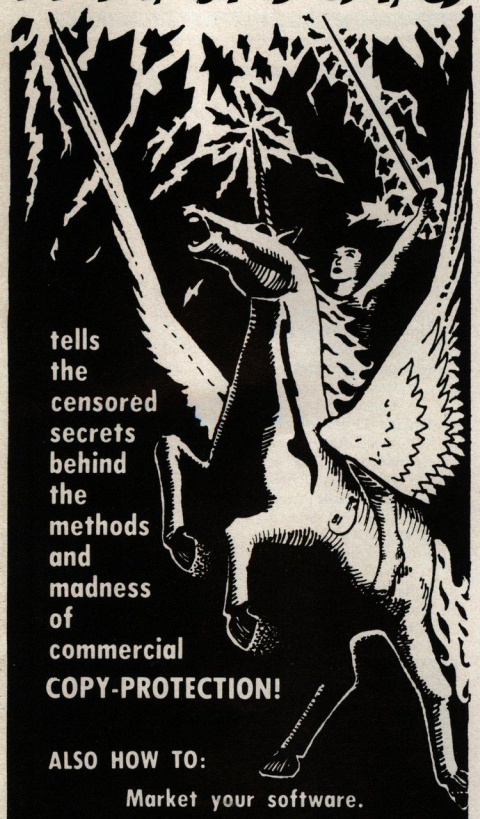
```
10  REM ********************************
11  REM *   TOUGH TFILE REFORMATTER    *
12  REM *       BY HAL CLARK           *
13  REM *      COPYRIGHT (C) 1982      *
14  REM *      BY MICRO-SPARC INC      *
15  REM *      LINCOLN, MA. 01773      *
16  REM ********************************
80  HOME : VTAB 6
90 CR$ =  CHR$ (13): REM  CARRAGE RETURN
100 D$ =  CHR$ (4): REM  CTRL D
110 SP$ = " ": REM  SPACE
120 RR = 0:PS = 0: REM  REQUIRED RETURN AND PREV SPACE FLA
    GS
130  DIM PG$(200)
140  PRINT
150  PRINT : PRINT "ENTER NAME OF FILE TO REFORMAT ": INPUT
     "";NM$
160  IF NM$ = "" THEN  PRINT D$;"CATALOG": GOTO 150
165  HOME
170  PRINT D$;"OPENTFILE-";NM$
180  PRINT D$;"READTFILE-";NM$
190  INPUT TL: REM  TOTAL INPUT LINES
200 NL = TL: REM  # OF SAVED LINES
210  INPUT LL: REM  LINE LENGTH
220  INPUT TV: REM  TAB VALUE
230  PRINT D$
240  PRINT "CURRENT LINE LENGTH -";LL - 1
250  INPUT "ENTER NEW LINE LENGTH =";PW
260  HOME : PRINT : PRINT  TAB( 14);"REFORMATTING"
270  PRINT  TAB( (40 - (6 +  LEN (NM$))) / 2);"TFILE-";NM$
     : PRINT : PRINT
280  PRINT  TAB( 14);"LINE LENGTH"
290  PRINT  TAB( 10);"OLD "; TAB( 25);"NEW"
300  PRINT  TAB( 10);LL - 1; TAB( 25);PW: PRINT
310  PRINT : PRINT  TAB( 12);"PROCESSING LINE"
320  PRINT  TAB( 10);"TOTAL"; TAB( 20);"INPUT "; TAB( 30);
     "OUTPUT": PRINT  TAB( 10);TL: PRINT
330  PRINT : PRINT "PRESS 'A' TO ABORT"
340 PS = 0:PH = 0: REM  PREV SPACE AND HYPHEN
350 I = 1:K = 1:PG$(I) = "": GOSUB 670
360  REM  MAIN INPUT LOOP
370  IF J = 1 AND K = 1 THEN TB = 1
380 CC$ =  MID$ (CL$,J,1):J = J + 1
390  IF PH = 1 AND CC$ = SP$ THEN  GOSUB 660: GOTO 480
400  IF PS = 1 AND CC$ = SP$ THEN 470
410  IF CC$ = SP$ THEN LS = K
420  IF TB = 1 AND CC$ = SP$ THEN 460
430 TB = 0
440 PH = 0: IF CC$ = "-"THEPH = 1
450 PS = 0: IF CC$ = SP$ THEN PS = 1
460 PG$(I) = PG$(I) + CC$:K = K + 1
470  REM
480  IF J <  = CL THEN 520
490  IF RR = 1 THEN  GOSUB 670: GOTO 530
500  IF PH = 1 THEN  GOSUB 660: GOSUB 670: GOTO 520
510 PG$(I) = PG$(I) + SP$:LS = K:K = K + 1: GOSUB 670
520  IF K <  = PW THEN 630
530 I = I + 1:PG$(I) = "":K = K - LS
540  IF K < 2 THEN K = 1: GOTO 570
550 PG$(I) =  RIGHT$ (PG$(I - 1),K - 1)
560 PG$(I - 1) =  LEFT$ (PG$(I - 1),LS)
570 LS = 1:PS = 0:PH = 0
580  VTAB (19): HTAB (30): PRINT I - 1
590  IF  PEEK ( - :16384) < 128 THEN 630: REM  NO KEY WAIT
     ING
600  GET A$: POKE  - 16368,0: IF A$ <  > "A" THEN 630
610  HOME : INPUT "SAVE OUTPUT? ";A$: IF A$ = "Y" THEN 750

620  GOTO 810
630  IF NL < 0 THEN 750
640  GOTO 360
650  REM  HYPHEN DROP SUBROUTINE
660 PG$(I) =  LEFT$ (PG$(I), LEN (PG$(I)) - 1):K = K - 1:P
     H = 0: RETURN
670  REM  GET LINE SUBROUTINE
680  PRINT D$;"READ TFILE-";NM$
690  INPUT CL$: REM  CURRENT LINE
700 CL =  LEN (CL$):RR = 0: REM  RECQUIRE RETURN
710  IF CL < LL - 1 THEN RR = 1: REM  REQUIRED RETURN NEED
     ED
720  PRINT D$:J = 1
730  VTAB (19): HTAB (20): PRINT TL - NL
740 NL = NL - 1
750  PRINT D$;"OPEN TFILE-NEW ";NM$
760  PRINT D$;"WRITE TFILE-NEW ";NM$
770  PRINT I - 1: PRINT PW + 1: PRINT TV
780  FOR J = 1 TO I
790  PRINT  CHR$ (34);PG$(J)
800  NEXT J
810  PRINT D$;"CLOSE"
820  PRINT D$
830  HOME
840  PRINT "REFORMAT ANOTHER DOCUMENT? "
850  INPUT " (Y= YES, N=NO) ";A$
860  IF A$ = "Y" THEN 20
870  TEXT : HOME
880  PRINT "END OF REFORMATTING.": END
```

hardcore



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Indexed Files Made Easy

by Chris Exner
178 Wakefield Street
Reading, MA 01867

INTRODUCTION

Perhaps you have run into this problem: You would like to build a big customer disk file where the records can be retrieved by customer name. If you put the records into a **sequential file**, it will take too long to locate a particular customer as your customer list grows since each record must be read in sequence.

If, on the other hand, you use a **random-access** file to hold your customer records you are limited in the access key you can use. APPLE random-access files allow integer (whole number) keys of numeric value from **0 to 32,767**, but there may be no meaningful way you can relate this numeric key to your customer's name. What do you do?

This article presents a method for building a random-access file in which **any field** of the file's record layout may be designated as the **"key"**. The field chosen must be in **alphanumeric (string) format** and may be of **any non-zero length**. The file technique combines sequential key searching with the indexing structure of an **Indexed Sequential Access Method (ISAM) file**.

You think of your records by a certain identifying field, be it customer name or social security number. You should be able to access the records by that field, and do so without having to purchase an expensive data base management system.

A note on equipment specifications: The file structure described is usable on an Apple II DOS system. The program "PRICE DEMO" which demonstrates the technique was written in Applesoft BASIC.

DISK FILE OVERVIEW

To accommodate a search technique efficient for an alphanumeric key field, the file is designed with **two main features:** First, the file is accessible in sorted order by the "key" field; and second, the file maintains index records with **pointers** into the sorted data records. The following paragraphs explain this design.

The file is basically a simple Apple random-access file. It has the features common to many sequential and random-access files.

1. The first record of the file holds the count of records on file.
2. New records are added to the end of the file.
3. The search for a particular key is accomplished by a **"read and compare"** process.

KEYSEARCH

Let's look at the key search more closely. Suppose you have a customer file and have chosen the name field of the customer record to be the "key" or search field. In an ordinary file, if you are looking for the customer record with the name **"JONES"**, you must start at the beginning of the file and **read every record** until you either have a name match of "JONES" or have read every record on file.

If you knew, however, that the records in your file were in **alphabetical order** by the name field, then your logic could differ; if the desired record is not on file you would not have to search the entire file. If the file is sorted you only have to search to the location where the record **should be**. For instance, when you read the name **"KELLY"**, or any name alphabetically greater than **"JONES"**, you can conclude that "JONES" is not on file. If your file is sorted, you can achieve a savings in search time.

NEW SEARCH LOGIC

Given that the records of the file can now be accessed in sorted order, let's again change the search logic. **Rather than always starting the search at the beginning of the file, we will start with a random record**. The program logic will first read a random record in the file and then **compare** the **"key"** field just read with the "key" value which is sought. If the keys match - fine, the search is over. Otherwise, the key comparison will determine the **direction** in the file in which to continue the search. If the key just read is **greater** than the desired key, the logic will **"back up"** in the file. If the key just read is **less than** the key we are seeking, the logic will **"go forward"** in the file. The logic will zero in on either the desired record or else the location where the record should be.

SMART START

In examining our search logic we might realize that it makes little sense to begin the search for the key "ZAPPA" at a random point in the sorted file. It would be smarter to **start the key search in the logical vicinity of the key**, i.e. start the search for "ZAPPA" near the end of the file, the search for "MILLER" near the middle and the search for "ADAMS" at the beginning. **To accomplish this "smart start" we will keep special index records**. Each index record will contain a **record number** to be used to start the search for a particular **range** of "key" field values.

There are two design features needed in our file in order to have an efficient search operation. First, the file must be kept in alphabetical (or other sequence) order by the field designated as our "key" field. Second, special index records to start the key search in the general vicinity of the key are to be maintained.

BACKWARD AND FORWARD POINTERS

At this point the reader may wonder how the file is to be kept in alphabetical order. It would be extremely awkward to require that the records be physically re-ordered after each addition to the file. There is an answer. The file will be ordered alphabetically through the use of **forward and backward pointer fields** in the data records. The backward and forward pointer fields hold the **record numbers** of the records whose keys are sorted before and sorted after the current key field, repectively. **Each data record will have these two pointer fields**. We will examine the forward pointer field first.

For illustration purposes, let us say we have a file consisting of **three records** - record numbers **29, 30** and **31**. The file is to be kept in sorted order by the item name field. The records contain the item name **"PEAR", "APPLE"** and **"ARTICHOKE"**. The record number order represents the order in which the data was entered. In other words, the "PEAR" record was added to our file before

continued on next page

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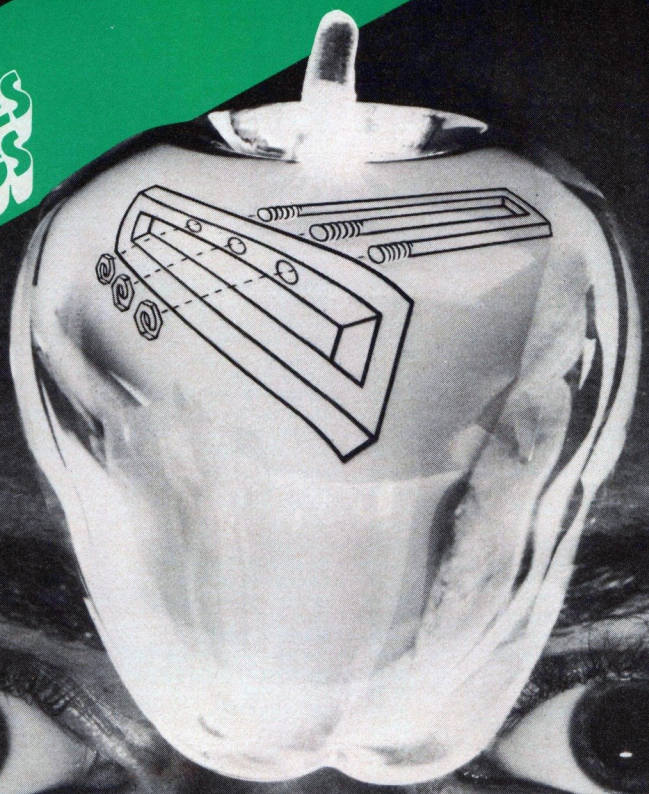

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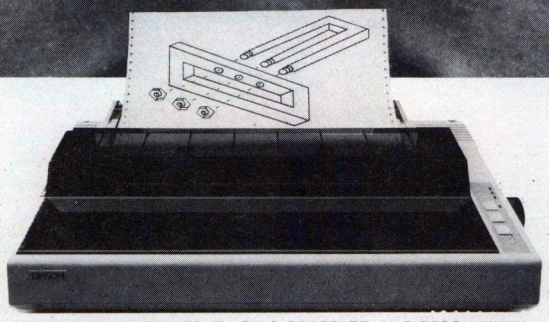

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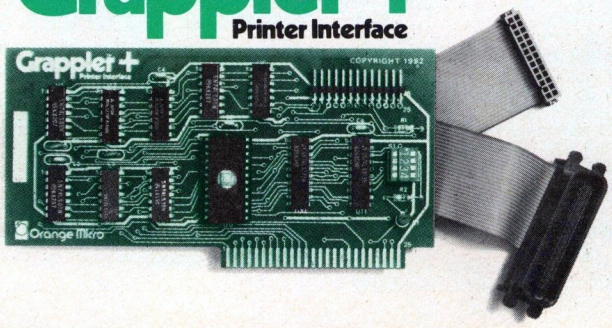

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Indexed Files Made Easy (Cont.)

the "APPLE" record; "APPLE" was added before "ARTICHOKE". Each new record is added to the end of the file, leaving the records in random order.

THE FORWARD POINTER

To each of these three records we add an additional field, the **forward pointer** field. **This field contains the record number of the next record, alphabetically by item name.** As seen in **illustration A**, the forward pointer in the "PEAR" record is zero because there is no record sorted after "PEAR". The forward pointer in the "APPLE" record is **31**, as the "ARTICHOKE" record 31 is sorted after "APPLE". The forward pointer in the "ARTICHOKE" record points to "PEAR", record **29**. With the forward pointer values in place, we can step through the file in ascending sorted order. "APPLE" points to record 31 (ARTICHOKE) and "ARTICHOKE" points to record 29 (PEAR).

THE BACKWARD POINTER

To each record we will now add a second field. This new field will be the **backward pointer** field and will point to the record sorted **before** the current record. (See **Illustration B** for backward pointer field values.) With the pointers keeping the file in alphabetical order, the **search logic** can become as follows: First, read a record and compare the key of the record just read with the key you are seeking. If the keys **match**, you are finished. If the key you are seeking is **greater** than the one you have read, then read the record whose number is in the forward pointer. Remember that the "keys" here referenced are the designated search fields of the record and not the random-access file keys, i.e. the record numbers. If the key you are seeking is **less than** the one you read, then read the record whose number is in the backward pointer.

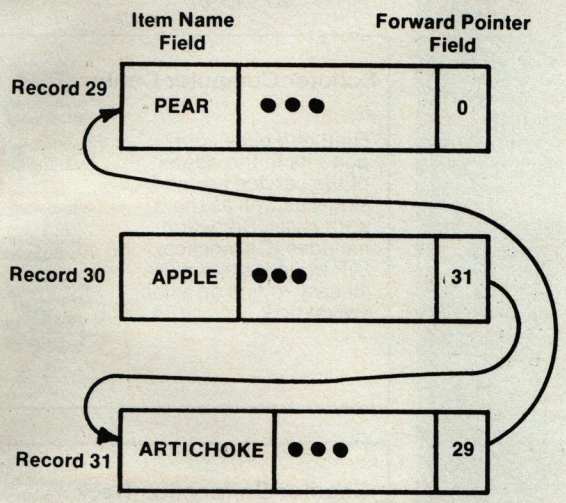

ILLUSTRATION A. The forward pointer fields keep the file in ascending order, by item name field.

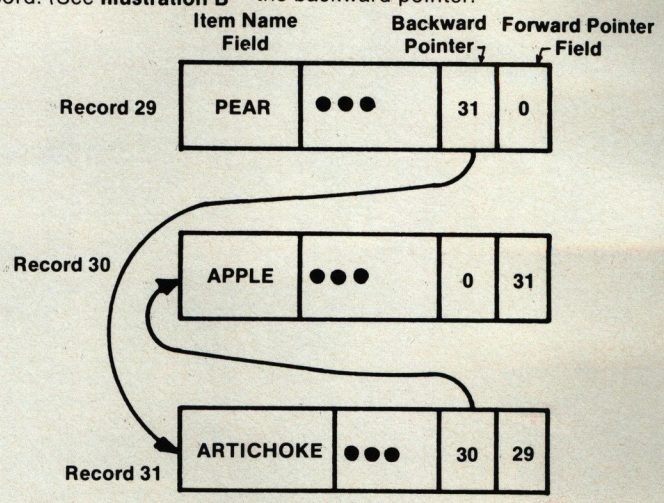

ILLUSTRATION B. The backward pointer fields keep the file in descending order, by item name field.

continued on page 160

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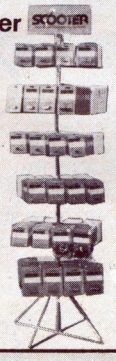

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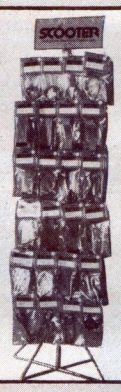

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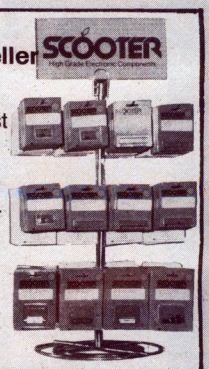

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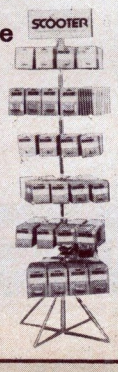

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Indexed Files Made Easy (Cont.)

INDEX RECORDS

In the file overview we discussed the desirability of starting our key searches in the known vicinity of the desired record. It is always possible to locate a key by stepping through the sorted records from any random point, but a time savings can be gained if the starting point in the file is chosen with greater precision. To help us choose better key search starting points, we use **index records**.

Index records are contained in a **reserved set** of records in the file. These records are not used for standard file data such as customer information or item prices. Rather, **each index record holds a number -- a random-access file record number**. These numbers are the **starting points** for the "read and compare" loops performed during "key" searches. Each index record starts the search loop for keys in a different range of values.

THE PRICE DEMO

To illustrate the building of an index structure, let us look at the demonstration program, PRICE DEMO. PRICE DEMO has twenty-eight records reserved as index records -- namely record numbers one through twenty-eight. The file holds price information and the **item name** field of the data record has been chosen as its "key" or search field. The index records, therefore, provide the starting points for item name searches. **Each index record starts the search for a different range of item name values**.

Index One holds the starting record for searches where the item name begins with the letter **"A"**. **Index Two** starts searches for **"B"** item names, **Index Three** for **"C"** names, etc. to **Index Twenty-six** for **"Z"** names.

Indexes Twenty-seven and **Twenty-eight** are reserved for item **names beginning with a non-alphabetic character - Index Twenty-seven** for characters whose ASCII code is **less than "A"** and **Index Twenty-eight** for characters **greater than "Z"**.

THE PROGRAM LOGIC

How does the demonstration program use its indexes when searching for a particular key? Let us follow the program logic as it begins the search for the item name **CAULIFLOWER**. The program first notes that the desired key of CAULIFLOWER begins with the letter "C". **Index Record Three** is used for **"C"** keys; therefore, the program reads record number three.

Next, the starting record number field in the index record just read is examined. If the number is zero, there are no "C" keys, hence no CAULIFLOWER, yet on file. If the number is not zero, the program reads the record designated by the number. For example, if Index Record Three holds record number ninety-five, then Data Record Ninety-five is read. The presence of ninety-five in the index record tells us that Data Record Ninety-five has an item name beginning with "C". It is therefore a good place on the sorted file to begin the search for CAULIFLOWER.

One further note on the case where the starting record number is zero, meaning there are no "C" item names on file - should the user wish to add a "C" record, the program would start the search for the appropriate position in the file at the first data record, Data Record Twenty-nine. In all, we can see that if a key category is represented on file, the indexes provide the program search logic with an efficient starting point.

PROGRAM RECORDS

The demonstration program, PRICE DEMO, maintains a file called PRICE LIST. PRICE LIST contains **three types of records** (see Table C for field descriptions). The **header record** holds the count of records on file, the **index records** contain starting record numbers for data record searches and the **data records** hold price information. Each data record consists of an item **name**, **price**, **backward pointer** and **forward pointer** field.

HOW IT WORKS

PRICE DEMO begins by reading the record counter field of the PRICE LIST header record **(lines 100-450)**. If the read is unsuccessful because the file did not pre-exist and is therefore empty, the **ONERR GOTO** clause of **line 300** is exercised and the program branches to **line 20000**. **Line 20000** begins the **OPEN ROUTINE** section where the index structure of the new file is set up. **OPEN ROUTINE** writes the header record and twenty-eight index records onto PRICE LIST. The record count field of the header record is initialized to **28** and the starting record number fields of the index records are initialized to zero. The program returns to **line 500**.

After the file PRICE LIST is opened, the program PRICE DEMO presents a menu of two options. One may **ENTER A PRICE RECORD or FIND A PRICE RECORD (lines 600-1400)**.

ENTER A RECORD

The ENTER A PRICE RECORD subroutine begins at **line 2000**. First, the user enters an item name and price from the keyboard **(lines 2000-2800)**. **Line 2900** calls the **FIND** subroutine at **line 8000**. FIND will locate either the record or else the spot where the record should be. FIND returns the variable **FOUND** with a non-zero value if the record is on file. If FOUND, at **line 3000**, does not equal zero, then the record is rewritten with the price information previously entered by the user. If FOUND equals zero, then the item is not on file and must be added **(lines 4000-6500)**. The addition of a new data record requires that not only the new record be written, but also that certain counters and pointers be updated. In detail, the record counter in the header record is increased by one. The new data record is written. The backward and forward pointer fields of the two records between which the new record fits alphabetically are updated. Lastly, the appropriate index record is rewritten with the new data record number.

FIND A RECORD

The FIND A PRICE RECORD subroutine begins at **line 7000**. The user enters the item name which he wishes found on PRICE LIST. Again, the **FIND** subroutine at **line 8000** is executed and the **FOUND** switch is checked. If FOUND equals zero, there is no record with the requested item name on file and **(RECORD NOT FOUND)** is displayed to the user **(line 7400)**. If the record is on file, then the price

continued on next page

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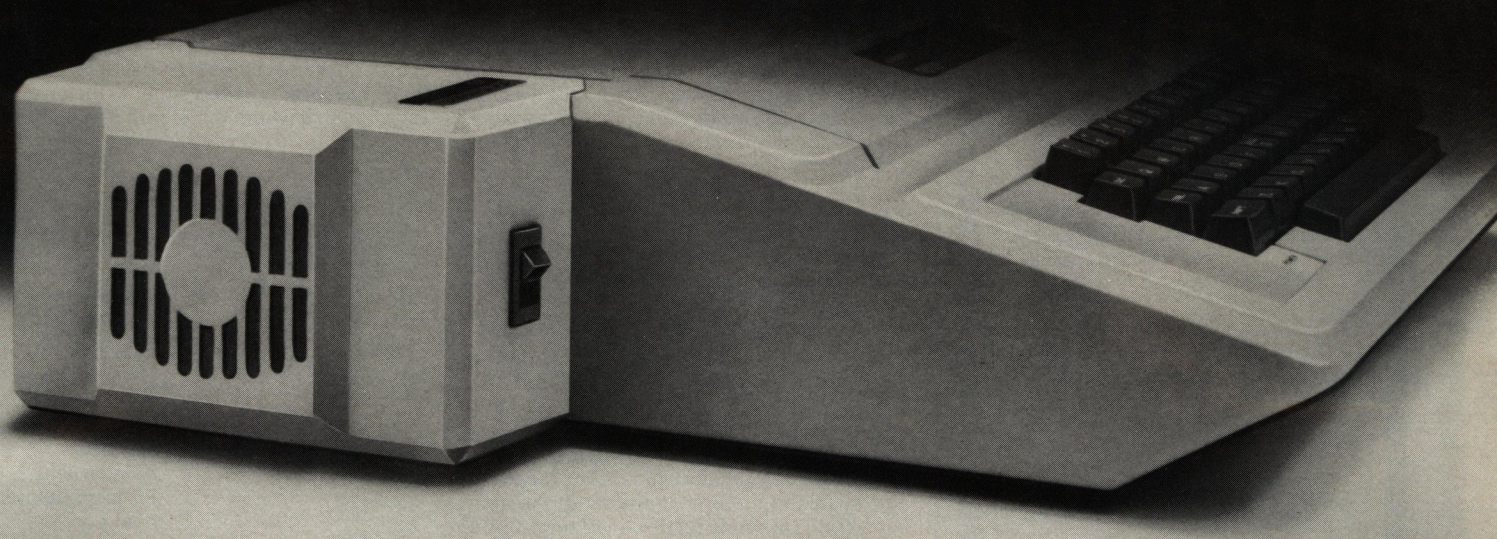

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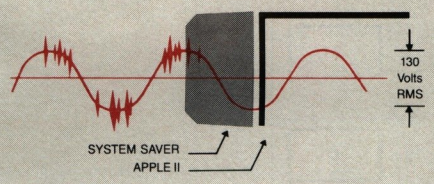

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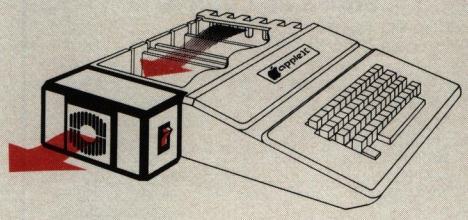

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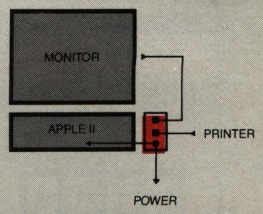

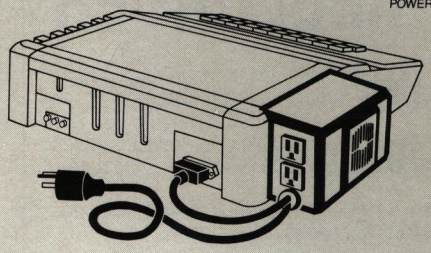

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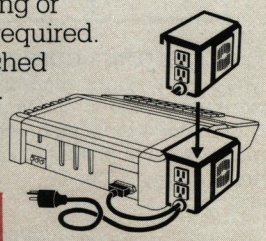

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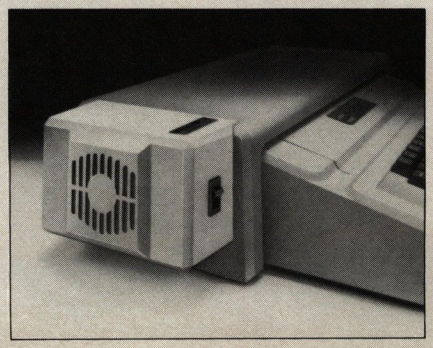

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Indexed Files Made Easy (Cont.)

information from that record is displayed on the screen **(lines 7500–7700)**.

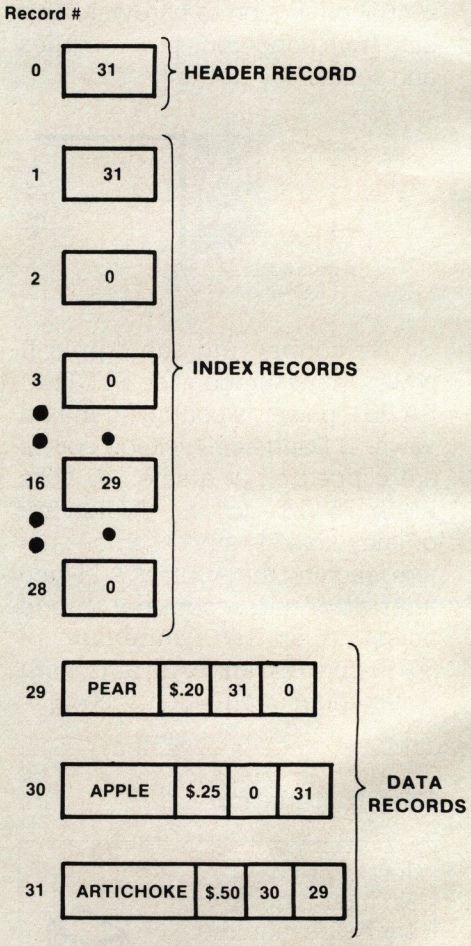
Both of the menu options utilize the FIND subroutine. **The FIND subroutine (lines 8000–9400)** is the heart of the PRICE DEMO program. Given an item name in the variable **NAME$**, the subroutine looks for a match of NAME$ in the item name fields of the data records on file. **The logic of FIND** is as follows: **First** the FOUND switch is initialized to zero. **Next**, the record counter from the header record is checked. If the counter is less than **29**, there cannot be any data records yet on file as the index records make up **28** of the record count **(line 8060)**. If the record counter is not less than **29**, then the FIND routine continues and reads an index record. As explained in the index record section of this article, Index Record One is for **"A"** item names, and Index Two for **"B"** names, etc.

Line 8200 determines which index record to read by taking the first character of the item name **(LEFT$(NAME$,1))**, converting it into its ASCII code and subtracting **64**. For example, the ASCII code of **"C"** is **67; then 67 minus 64 is 3, so Index Record Three is used for "C" keys**. FIND reads the index record and obtains the starting record for its search **(lines 8300–8500)**. The search logic is a loop which continues until the name read **(RNAME$)** is equal to the name entered by the user **(NAME$, lines 8600–9400)**. If RNAME$ is less than NAME$ then the search will continue by reading the record number in the forward pointer **(FPTR)**. If RNAME$ is greater than NAME$, the backward pointer field will be used. In the case where the desired record is not on file, the point will be reached where both directions have been pursued without finding the record. The loop is then ended **(lines 9100 and 9300)**. The loop is exited either at the desired record or else where the record should be.

TABLE C. Field Descriptions of the Various Record Types:

Header Record	**- Record count field**
Index Record	**- Starting record number field**
Data Record	**- Item name field ("key" or search field)** **Item price field** **Backward pointer field** **Forward pointer field**

ILLUSTRATION D. Sample Price list File Record Contents



CUSTOM MODIFICATIONS

The twenty-eight record index structure described in the preceding paragraphs is designed for a data file of moderate size and organized by alphabetic keys. That index structure may be easily modified for other uses.

continued on page 169

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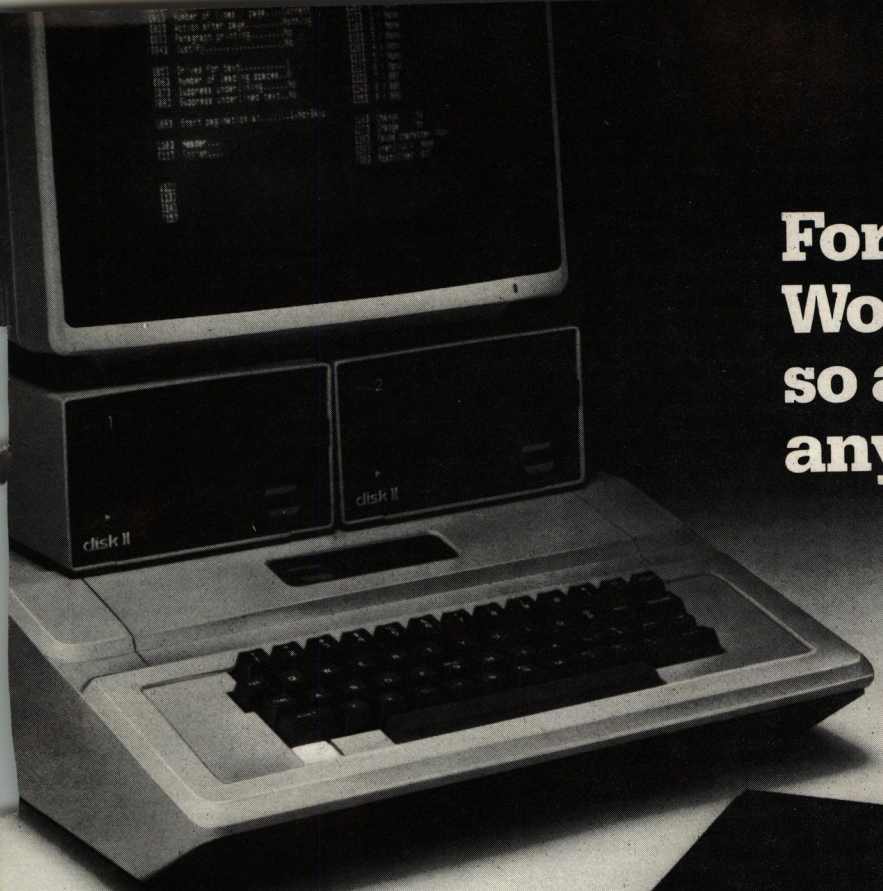


Format II was tested for six months in the demanding arena of Wall Street. Distributed by local dealers to law firms, financial institutions, and the like, Format II was used by secretaries and non-technical personnel. Overwhelmingly, Format II was recognized as one of the easiest and most effective word processing systems available *in any form.*

Here's why Format II is unique among word processing programs:

What you see is what you get. Format II performs virtually any editing and formatting function you can imagine and displays on the screen the text exactly as it will print out—paragraphs, underlining, justification, page breaks.

Simple to Use. You edit and format text with single key strokes. "D" for delete, "E" for edit, "I" for insert, "J" for justify, etc. Easy-to-remember commands because they make sense.

It supports all printers compatible with the Apple. Shadow printing, boldfacing, proportional spacing, sub- and superscripting are all available.

Includes a sophisticated Mailing List. Stores and retrieves names and addresses which may be printed on labels or incorporated into documents. Powerful "logic" commands allow you to select only those records which match specified criteria.

And more. Format II is lightning fast and menu driven. Add them all together and it's clear why Format II has generated such enthusiasm. Now, at a cost of $250, you *too* can buy the best.

Format II is available from most local dealers. If not, ask them to contact us, or order directly and receive a 30 day money-back guarantee.

Kensington Microware Ltd., 300 East 54 St., Suite 3L, New York, NY 10022, (212) 486-2802.

KENSINGTON MICROWARE

System Requirements: 48K Apple® II Plus with 80 column card.

nibble® software

APPLE TRAC PLUS/SPACE MAZE...
$24.95 + Shipping
Featured in Vol. #1, Issue #1

Apple TRAC Plus is an easy-to-use, adaptable system for analyzing "Where your Money Goes." TRAC Plus accepts information about your credit cards, checks, and cash transactions and prints more than 10 different reports for Budget Spending Analysis. Examine Year-To-Date Spending, Trends, Comparisons to Average Spending. (TRAC Plus is the core program for a complete Personal Finance system with its companion programs TRAC Budget, TRAC Graphics, and Income TRAC (offered as separate disks in this ad).
(48K AS)

Space Maze is a Hi-Res Graphics game in which the player pilots his ship through a Maze using the Game Paddle controls (or a joystick). Includes a number of sound options and two levels of play. A challenge for all! **(16K AS)**

STAR ATTACK/AIRSEA BATTLE/ LOW RES SHAPEWRITER...
$19.95 + Shipping
Featured in Vol. #1, Issue #2

Star Attack is a very fast, Hi-Resolution Graphics Gallery game. It combines Assembly Language and either Applesoft or Integer Basic for fast challenging action. Seven ships scan across the screen making random appearances, sometimes at random speeds. Some are Hostile Klingon and Tie Battle ships. Others are friendly... Hospital ship, Communications Satellite and more. The trick is to zap the bad guys and avoid hitting your friends... and it's not easy! Runs under game paddle control.
(32K AS/IB)

Airsea Battle combines Assembly Language and Integer Basic to produce a Low-Resolution Graphics battle between the Navy and the Air Force. You can choose sides (in either the Two-Player game or the One-Player vs. the Apple). Shapes, Explosions, and Splashes heighten the Graphics effect. **(16K IB)**

Low Resolution Shapewriter is a combined Assembly-Language and Integer Basic program for creating and running high speed Low Resolution Shapes in your programs. You create shapes with Up, Down, Right, Left, and Plot/No Plot commands from the keyboard. Instructions are given for saving shapes and then integrating them into your own programs. **(16K IB)**

APPLE TEXT PROCESSOR (T.O.U.G.H.)/APPLE SIMON/TIGER GRAPHICS... $24.95 + Shipping
Featured in Vol. #1, Issue #3

Apple TOUGH (Text Outputter, Updater, and Generalized Handler) transforms your Apple into a line-oriented Text Processor. It is very easy to use and allows: • Upper/Lower Case characters; • Right Margin Justification; • Tab/Indent; • Variable Line Length; • Horizontal Page Centering. **Editing Features** include: • Review; • Erase/Retype Lines; • Insert Lines; • Shift Paragraphs; • Find/Replace words and Print Text. Operates with Parallel or Serial Printer (and incorporates features of Epson MX-80, IDS series, and Centronics 737-739). Requires 1 disk drive. **(48K AS)**

Apple Simon is a Low Resolution Graphics version of the popular game. Combines Color and Sound to test your coordination and memory! It's fun! **(16K IB)**

Tiger Graphics is an Applesoft and Machine Language program for printing the High Resolution Graphics screen to the IDS 440/460 Paper Tiger Printers. Program controls allow printing with Black-on-White or White-on-Black. Requires the printer to be equipped with the Graphics Option. **(32K AS)**

FAST/SUPER WEAVER/FOOTBALL...
$24.95 + Shipping
Featured in Vol. #1, Issue #4

F.A.S.T. (Forecasting and Sales Trending) is a Simulation and Modeling Tool for testing different strategies in selling multiple products and services. Prompts the user to build a productivity model which is then used to test different Hiring Rates, Pricing, Product Emphasis and Product Introduction Timing. Four different reports project Unit and Dollar Sales. **(16K AS)**

Super Weaver simulates an 8 Harness Loom in High Resolution Graphics. Simple keyboard commands allow the weaver to enter the threading, tie-up, and treadling of the Loom to produce a woven pattern on the screen. The finalized pattern can then be printed as a Draw-Down on a Centronics compatible parallel printer (it is written for the IDS 440 printer). **(16K AS)**

Football is a Low Resolution Graphics simulation of the popular hand-held game. Two players alternately choose Running, Passing, or Kicking plays in order to score touchdowns and field goals. **(16K IB)**

PIP I/I AM BUDDHA/TAPE LOAD AIDS... $24.95 + Shipping
Featured in Vol. #1, Issue #5

PIP I is a Tape-based Personal Inventory Program which provides data base management for inventorying and tracking your personal assets. PIP I provides reports on Depreciation Costs, decreasing Replacement Values, Overall Asset analysis, and more. Optional Serial/Parallel printer. **(32K AS)**

I Am Buddha is an interactive game which produces surprising answers to your What, Who, Where, Why, When, and How questions. A little oracle! **(16K AS)**

Tape Loading Aids are two utilities which assist an accurate loading of programs and data from tape cassettes. Provides audible confirmation of beginning and end of Load. The second provides Auto Re-Try if errors are encountered. **(16K ML)**

PIP II/AMPER-INTERPRETER/ FOUR-IN-A-ROW... $29.95 + Shipping
Featured in Vol. #1, Issue #6

PIP II (Personal Inventory Program) provides a complete **disk-based** data management system for managing and tracking your personal assets. It is a disk version of PIP I (described above). Uses optional Serial/Parallel printer. **(48K AS)**

Amper-Interpreter Utilities provides an extremely powerful Utility Library for your Apple. It uses the Ampersand Key to emulate the PRINT..USING command for formatting Decimal, Binary, Floating Point, and Hexadecimal Results. Provides Hooks to also: • Clear Screen; • Clear Page; • Bell; • Clear Error; and • execute ONERR patch. **(48K ML)**

Four-In-A-Row is an interactive Low Resolution Graphics game of skill and strategy. You'll try to beat your opponent to a Four-In-A-Row line of blocks to win. Watch the Force of Gravity drop your blocks through the grid as each play struggles for a Win! **(48K IB)**

APPLE A.I.M./CONCORDANCE/LOW SCORE II... $29.95 + Shipping
Featured in Vol. #1, Issue #7

Apple A.I.M. (Automated Intelligent Mailing) is a highly modular system for managing Mail Lists and other Filing/Retrieval/ Listing applications. With A.I.M., you can define up to 32 different Fields of Information in each record. Rearrange and Select special Fields for formatting/printing. Includes options for: • Formatting; • Adding; • Deleting; • Editing; • Finding; • Sorting; and • Printing the stored information. You can print Mailing Labels directly from your disk file! Uses a serial or parallel printer. **(48K AS)**

Apple Concordance is a powerful Utility which aids your programming! Automatically prepares lists of Where your Program Variables are Used and how they're Referenced. Also prepares a Cross-Reference of Program Line Numbers and where they are used. **(32K ML)**

Low Score II is a Hi-Res graphics game of Skill and Strategy. Try to Beat the Apple to the Lowest Score to Win! Uses a library of shapes which can be applied to your own programs! **(32K AS)**

WILL 'O THE WISP/BLAST AWAY LOAN REDUCTION ANALYSIS...
$19.95 + Shipping
Featured in Vol. #1, Issue #8

Will 'O The Wisp is a complete Adventure-type game that takes you through forests, caves, and castles to the den of Ralph, the Magician. You follow the Will 'O the Wisp (which sometimes leads you correctly and other times leads you into dangerous turf). Illustrates the principles involved with writing your own Adventure games. **(48K AS)**

Blast Away! is a fast action shoot 'em up in Low Resolution graphics. As each window of the old ghost house lights up you have to quickly aim and fire before the ghost moves on. Illustrates a number of game writing principles. Uses joystick or game paddles. **(16K AS)**

Loan Reduction Analysis is a useful application for testing alternate financing methods for your major purchases. Simple screen prompts let you test Interest, Changes in Interest, Term of Loan, etc. Produces a screen full of resulting payments (while varying the principal and interest). **(16K AS)**

APPLE CHAMP/AMPER READER/ APPLE COMMUNICATOR...

$29.95 + Shipping
Featured in Vol. #2, Issue #1

Apple CHAMP (Checkbook Advanced Management Program) is a versatile data entry and checkbook reconciliation system. CHAMP allows for record Addition, Editing, Search/Change, Posting, and Bank Reconciliation. It maintains automatic running bank balances and facilitates monthly checkbook balancing. Requires 1 disk. **(48K AS)**

Amper-Reader is an Assembly Language program which speeds disk file access of sequential text files by 5-10 Times Normal Speed. Dramatically Reduces DOS Overhead for reading large files. Optional Automatic Record Blocking for large files, i.e. you can read in 10 or 20 or 100 records at a time from files containing many more records (in order to conserve memory space). Disk contains Amper-Reader and demonstration program. Requires 1 Disk. **(48K ML)**

Apple Communicator is a basic demonstration program for assembling words and sentences using the Game I/O Connector. Under Game Paddle Control, the cursor scans across the Screen-displayed Alphabet. Pressing the button picks a letter to add to words being formed at the bottom of the screen. Adaptable to a variety of input/control methods for communication with people who may be handicapped and unable to speak or type. **(16K IB)**

MUSIC RETRIEVAL SYSTEM (M.R.S.)/LE MANS/MORSE CODE SYSTEM... $19.95 + Shipping

Featured in Vol. #2, Issue #2

Music Retrieval System (M.R.S.) is a fast, flexible file management system for storing, cataloging, and retrieving information on your record collection. Sort by title, composer, etc. M.R.S. is readily adaptable to other storage/retrieval tasks by changing the data names. **(48K AS)**

Le Mans is a very fast racing game in Low Resolution graphics. One or Two Players compete by guiding the race car(s) along twisting, narrowing roads. Watch out for crashes and make it safely through the passes to win. **(16K IB)**

Morse Code System generates Morse Code sight and sound for learning Digits, Alpha, and Special Characters. Demonstrates the use of the DOS EXEC Commands for file control and automatic Apple operation. **(16K IB)**

APPLE PAINTBOX/MAD MAD CUBE/LINEFINDER... $24.95 + Shipping

Featured in Vol. #2, Issue #3

Apple Paintbox is a High Resolution Graphics program which combines the functions of Etch-A-Sketch, Spirograph, and a Function-Driven Drawing Board. Automatic Color Selection, Lines, Rectangles, Curves, and Auto-Color-Fill-In make it an unusual graphics drawing aid. Optional Disk for saving Pictures. **(16K AS)**

The Mad Mad Mad Mad Cube is a Low Resolution Graphics version of the popular 3x3x3 plastic Cube Game. After setting the colors of the faces of the cube, the blocks of 9 cubes can be rotated Horizontally and Vertically. After several rotations, the challenge is to return to the original color combination. Optional Disk for saving Cube configurations. **(24K AS)**

Applesoft Linefinder is a powerful Utility for locating individual Applesoft program lines in memory. Use for Appending Forbidden Line Numbers, Repairing Programs, Improving Program Efficiency and more. Specifying the Target Line searches for the Start/End memory position. Also produces information on Program Start/End, Hi-Mem, Strings, Free-Space, Variables and Arrays. **(48K AS)**

APPLE STAR SYSTEM/TRAP'EM/ BOOT 3.2/3.3... $29.95 + Shipping

Featured in Vol. #2, Issue #4

Apple Star System is an extremely powerful and flexible system for data file management. The program is generally self-prompting, and allows the user to enter and delete data, as well as to display entries and modify them as needed. Deleted records may be restored quickly and easily. Other features include data output to a printer and single field sorting. Requires 1 disk drive. **(48K AS)**

Trap'em is an addictive character graphics game that combines quick reflexes with quick thinking. You may choose to play against up to 3 deadly beasts which stalk you as you attempt to trap them while staying out of their fatal reach. Trap'em is written entirely in Applesoft. **(16K AS)**

Boot 3.2/3.3 is a machine language utility which allows you to boot thirteen sector diskettes under DOS 3.3 without the inconvenience of using the Basics disk or running "BOOT 13". The program modifies the data write and sector search routines of the RWTS. Boot 3.2/3.3 does not destroy the 3.3 sector header, so the diskette may be easily restored. **(48K ML)**

APPLE DISK MASTER/APPLE TRAP-STEP/BIORHYTHMS... $29.95 + Shipping

Featured in Vol. #2, Issue #5

Apple Disk Master is a multi-featured DOS utility program for the Apple. It allows: Recovery of Deleted Files; Direct Track/Sector Examination; Catalog Sorting; and a variety of other functions. It is adaptable between DOS 3.2 and 3.3 with the change of a single memory location. **(48K ML)**

Apple Trap/Step is a powerful Applesoft Program Development Aid. It allows single stepping through the execution of an Applesoft program to examine program logic. It also allows the placement and removal of "Traps" throughout the program to examine the values of specific variables without disrupting the program flow. **(48K ML)**

Apple Biorhythms is a versatile implementation of the popular Biorhythm principle. It produces Printed Bio-Charts as well as Low Resolution Graphics display. Now you can take your Bio-Charts with you to watch for critical days. For IDS or EPSON printers. **(48K, Printer, AS)**

APPLE M.A.P.S./T-SORT/ARTIST...

$29.95 + Shipping
Featured in Vol. #2, Issue #6

Apple MAPS is a Comprehensive Marketing and Personal Shopping system. It helps keep track of your stock of Groceries and other Items; Flags the Need for Buying Stocks; and even Prints a pre-sorted Shopping List! Learn What You Have and What to Get! Keeps running totals on all products. Easy Editing of Grocery files. **(48K AS)**

Amper-Jump and T-Sort is a fast Machine Language Utility for Sorting Primary and Index Fields of arrays simultaneously! This gives the sequence of a Sorted Field and the Index to the Physical Location of each Record in the File! The utility uses less than 2K of memory and sorts arrays of any size. **(48K ML)**

Apple Artist is a Hi-Res Graphics Picture Maker which puts you in Command of the Screen. Your Keyboard controls the direction and includes functions for drawing Boxes, Fill-Ins, Lines, and More. Pictures may be saved to disk. **(16K AS)**

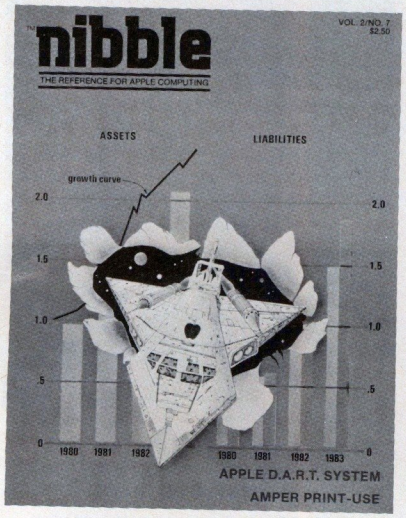
nibble® software

APPLE DART/PRINT-USE/LASER BLASTER... $29.95 + Shipping
Featured in Vol. #2, Issue #7

Apple D.A.R.T. is a Home Finance System which allows you to compare Monthly Expenditures. It projects Future Expenditures and Debts for 15 Debt Accounts, 10 Asset Accounts, and 5 Miscellaneous Accounts. It allows you to evaluate and plan your Financial Position. Project your Net Worth! Test new Investment and Debt Strategies. Show the past year's history and the coming year's projections for any combination of accounts. **(48K AS)**

Amper-Print-Use is a powerful Machine Language Utility for Fast Formatting of Alphabetic and Numeric Information. It simulates the PRINT...USING instruction found on other larger computers and handles Column Headers, Decimal, Scientific notation, Left and Right Justification of Strings... and more. Numbers may be rounded and aligned with dollar signs, commas and/or exponents. Instantly accessible from your Applesoft Programs. **(48K ML)**

Laser Blaster is a Hi-Resolution Graphics Action Game in outer space. Asteroids and Aliens are on a Collision Course with your Space Station. Rotate your Laser Turret and Fire before they HIT! **(16K AS)**



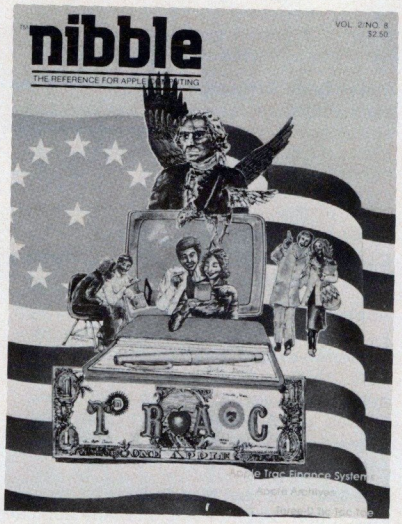
FINANCIER III/POOR BOY'S LE/ CATSUP/NFL RANKER...
$19.95 + Shipping
Featured in Vol. #2, Issue #7

Financier III is a complete Apple Financier package, with direct reduction loan calculation, amortization, two types of depreciation, simple interest calculation and interest through compounding. **(32K AS)**

Poor Boy's LE is a program editing aid that is transparent to the user's program. Features include start and stop list, fast cursor advance, screen clear, shorten line length, and last BLOAD address and length. **(48K ML)**

Apple CATSUP is a **HELLO** program which will catalog a disk and provide a shorthand method for issuing DOS commands. All commands are presented in menu format and may be invoked by using one or two keystrokes. **(48K AS)**

NFL Ratings System is a quantitative program that measures the relative strengths of all the NFL teams and updates itself as the season progresses. The program will predict the correct winner of pro football games with 70 to 75 percent accuracy. **(48K AS)**



TRAC"B"/TRAC GRAPH/ARCHIVES/ TIC-TAC-TOE... $29.95 + Shipping
Featured in Vol. #2, Issue #8

TRAC "B" (Budget TRAC) is a Flexible, Fast Budget account Preparation and Reporting System for your Personal Finances. Working with Apple TRAC (offered elsewhere in this ad) TRAC "B" allows Manual or Automatic Budget preparation using information from your original TRAC files. Allows Budget/Actual comparisons, Individual Account % of Total, and Over/ Under Calculation. Uses the screen and/or optional Serial or Parallel Printer. **(48K AS. Recommended: TRAC Plus)**

TRAC GRAPH plots your Finances in Hi-Resolution Graphics for each Finances Category, Takes information directly from the TRAC Files and Charts it for Review. A Picture is worth Many Numbers! **(48K AS. Required: TRAC Plus)**

Apple Archives is a super-fast Machine Language program for Automatic Transfer of Disk Files to and from Tape Cassette. Allows entry of Header Information Record to Tape. Backup your Disk Files automatically and Inexpensively with Tape copies! **(48K ML)**

Three-D Tic-Tac-Toe is a Lo-Res Graphics version of the popular multi-level board game. Fast Action and Automatic Scoring! **(16K AS)**

HEXPAD/DOS REMOVER/COMMAND CHANGER/FORMAT/X-Y PLOT...
$19.95 + Shipping
Featured in Vol. #2, Issue #8

Apple Hexpad is a new "Phantom" Keypad for Fast, Easy Entry of Machine Language programs into your Apple. It transforms a portion of your keyboard into a true HEXPAD. Features automatic Forward/ Backward 8 position spacing! **(16K AS)**

DOS Remover physically expunges DOS from Tracks 1 and 2 of your Diskettes. Frees an additional 8K of disk storage for those Large Files. **(48K AS)**

Command Changer lets you physically Change and Shorten your DOS commands to your own taste. Great for Customized programs! **(48K AS)**

Formatter is a Routine for Controlling the Format of Data Entry for your screen applications! Professional looking screens are a snap. **(16K AS)**

X-Y Plot provides simple parameters for Plotting Data with the Apple Tool Kit. **(32K AS + Toolkit)**

TURTLE GRAPHICS/TRAC "I"/ CRUNCHER... $29.95 + Shipping
Featured in Vol. #3, Issue #1

Apple Turtle Graphics is a pseudo LOGO-type language for Guiding your Hi-Resolution Turtle around the Screen! You write a series of simple Instructions for Directing the Turtle to Move, Turn, and Draw... and it follows your every command! The program is also a study in the development of new pseudo-languages. **(16K AS)**

TRAC "I" (Income TRAC) adds a Third Major Module to the TRAC Home Finance System. It is an easy-to-use system for monitoring your Income from various sources. Generates Reports for Year-to-Date Income Profiles (and Monthly Income Statements... using data from TRAC Budget and TRAC Files shown elsewhere in this ad). Shows Current vs. Average Months and Income Summaries. **(48K AS. Recommended: TRAC Plus)**

Applesoft Line Cruncher is a powerful Utility for compressing Multiple Applesoft Program Lines into Single, Multi-Statement Programs. Speeds up your programs and reduces the amount of Memory required to contain your Applesoft programs. **(48K ML)**

SCRAMBLE/CHECKER/SCROLL/ X-REF/FREE SPACE... $19.95 + Shipping
Featured in Vol. #3, Issue #1

Apple Scramble is a Hi-Res version of the Popular $.49 Letter/Tiles Game. Arrange the Letters in Alphabetic Order by sliding the Tile this way and that. Great for learning game logic and control while you test your manipulative skills. **(48K AS)**

Apple Checker is an important Utility for comparing your typing of **Nibble** Programs with Checksum totals which are published in **Nibble**. **Checker Checksums are published for the major programs in each issue. (48K ML)**

Lo-Res Hyper-Scroll provides very Fast Four-Way Scrolling of your Screens. A very handy technique for Spectacular Screen Displays. **(48K ML)**

Variable Cross Referencer allows you to Extract, Sort and Alphabetize all of your Applesoft Variables along with the Program Line Numbers where they are used. **(48K AS)**

Amper Free Space uses the Ampersand to trigger a useful Disk Free Space indicator. Now you can find out how much disk space is left, Any Time... without loading other programs! **(48K ML)**

APPLE MLE/LAMP/APPLE CAL...
$29.95 + Shipping
Featured in Vol. #3, Issue #2

Apple MLE (Machine Language Editor) is a powerful and unique Utility for Entering and Editing Machine Language Programs. It allows dynamic Insert, Delete, and Xchanging of Machine Code directly in Memory. Includes full Disk Command set for retrieving and saving files. NO MORE RETYP!NG of Machine Language programs to correct minor errors. A Must in your Library! **(48K ML)**

LAMP Is a useful Utility program which contains the following features: • Decimal-to-Hex Conversion; • List parameters of Last BLOADed or BRUN program; • Find the location of an Applesoft Line in Memory; • ASCII Conversion; • Locate Specified Program spaces in Memory; and • Display Free Sectors on Disk Drive 1 or 2. **(48K ML)**

Apple CAL allows you to schedule Events, Holidays, and Appointment Days, Months or even Years in advance. Automatically prints Month Calendars for Any Month you Specify for any year between 1981 and the year 2000. Retrieves key Holidays through 1987! Easy and Handy! **(48K AS)**

APPLE SLUGGER/PIECHART/ AMPER-FIND/SORT... $19.95 + Shipping
Featured in Vol. #3, Issue #2

Apple Slugger is a Hi-Res Action Baseball Game. Pitch, Bat, and Field in your own home! The Routines can be used in your own game development! **(16K AS)**

Apple Piechart is a set of routines which use the Apple Toolkit for Hi-Res Pie Charting with Color, Labels, and Highlighting! **(Toolkit, 16K AS)**

Amper-Find is a Fast Machine Language Utility for Searching Out Variables, Strings, and Commands in your Applesoft Programs. Great for checking out Variable Name useage! **(16K ML)**

Speed Sort will Speed Up your String Sorting by a factor of 60. Handles One and Two Dimension Arrays in a Flash. Includes instructions for appending the machine language to your Basic program for automatic loading. **(48K ML)**

APPLE BOND MANAGER/DOS 3+2/ DARTS... $29.95 + Shipping
Featured in Vol. #3, Issue #3

Apple Bond Manager is a comprehensive program for Analyzing Alternate Bond Investments. You enter information about Bonds and your own Financial position and Bond Manager produces Comparative Gross Yields, Capital Gains Yields, Current Yields, and After Tax Yields. Bond Records can be stored, retrieved, and edited from disk as needed. **(48K AS)**

DOS 3+2 is the perfect Utility for fast Switching between Apple's DOS 3.2 and 3.3. It provides for Co-Resident 3.3 and 3.2 and is selectable from within any program with a single POKE. Any Disk Read Error will automatically Switch to the "Other" DOS version to try reading again! Read and Write on 13 or 16 Sector Disks Interchangeably! **(48K ML)**

Apple Darts is a challenging Hi-Res Graphics Dart Game. Two Levels of Play and spectacular Hi-Res displays heighten the fun. It takes skill and quick timing to Win at Darts! **(16K AS)**

AMPERSPEED/LAMP II/ PROTECTOR/3-D MAP...
$22.95 + Shipping
Featured in Vol. #3, Issue #3

Amperspeed is a very fast Utility program for Reading and Writing Sequential Text Files. Improves the disk access speed by nearly 3 to 1! **(48K ML)**

LAMP-II works with LAMP-I (offered elsewhere in this ad) to add more utility functions to the LAMP Library. It includes a utility for placing itself or Any Program between DOS and its Buffers. Adds 3 Letter Commands for Cataloging and displaying Free Sectors on Disk Drive 1 or 2. **(48K ML)**

Program List Protector is a Utility Processor for preventing your Applesoft programs from being Listed or Run by unauthorized people. Simple to Use. Keys the program access to your own Code-Word. **(48K AS/ML)**

3-D MAP is a demonstration program for displaying 3 Dimensional Landscapes using the Apple Toolkit. Describes the methods used for converting Two to Three Dimension Displays. **(16K AS + Toolkit)**

MICRO-CALC/VARIABLE CRUNCHER/LIFE... $29.95 + Shipping
Featured in Vol. #3, Issue #4

Micro-Calc generates your own, customized Finance programs for Home and Business. You set up your own Accounting Spreadsheet on the Screen. You specify Data, Comments, and Formulas for up to 20 Columns and 20 Rows. You can examine the results with Left and Right screen Scrolling. Then Micro-Calc takes over and literally Creates your own Applesoft program to do the job! **(48K AS)**

Applesoft Variable Cruncher is a powerful Utility for Compressing your Variable Names to One or Two letters. Don't be afraid to waste memory writing Long, Descriptive Variable Names. Cruncher will shrink them down to size. Your programs will save memory and run faster. **(48K ML)**

Apple LIFE is a fast, Hi-Resolution Graphics program which allows you to set up your own Colony of Life Cells. Then the cells follow simple but powerful rules for Birth, Death, and Survival. The Colony begins to Live... Grow... Decline... and Create other Colonies. Fascinating to Watch. **(48K AS)**

ABACUS/GO/QUICKSORT/INITIA...
$22.95 + Shipping
Featured in Vol. #3, Issue #4

Electric Abacus is a Lo-Resolution Graphics version of the timeless oriental calculator. Demonstrates the logic and operation of your very own Graphic Abacus. **(16K AS)**

Apple GO is a flexible Utility which exercises All of your DOS Keyboard Commands with only a Keystroke or two for each command. Use a Single Letter for the Command and a Single Letter-designator for each File Name. Also displays Disk Free Space, File Sizes and Binary File Addresses and Lengths. **(48K AS)**

QuickSort is a fast Machine Language Utility for Sorting your Arrays 50-170 Times faster than with Applesoft. A Simple Ampersand-Command specifies your One or Two Dimensional Array and puts the array in order in a Flash. **(48K ML)**

Apple INITIA is a unique Utility for Setting and Resetting Individual Arrays within your Applesoft Programs. With normal Applesoft, you have to use FOR...NEXT Loops to initialize and clear arrays. It takes 47 seconds to initialize an A$(1000,10) Array. INITIA does the job in 2.5 seconds! **(48K ML)**

A.L.E. (APPLESOFT LINE EDITOR)/ SPRINT/OTHELLO . . . (Intro Price: $19.95 + Shipping
Featured in Vol. #3, Issue #5 . . . Price expires Nov. 15, 1982 . . . **New Price $29.95 + Shipping)**

A.L.E. (Applesoft Line Editor) is a powerful utility for helping you write and edit Applesoft programs. Auto Line Numbering, Insert, Delete, and other commands allow you to directly edit program lines without having to retype or recopy entire lines. Watch your Applesoft lines Open Up Magically to Make Room for Additions! A Single Control Character saves the Entire Line when you've finished Editing it. A.L.E. is a MUST for your Library. **(48K ML)**

SPRING (SPEED READING IMPROVEMENT TECHNIQUE) is an automatic Text/Number Generator which can help you increase your Reading Speed by up to 100%. It has options for Pre-schoolers up through the Adult level of Reading. **(48K AS)**

OTHELLO is a Lo-Res Graphics version of the popular board game. You Flip and Flank your Opponent and capture More and More Pirces to Win. You can Play against another Player or against your Apple! And your Apple is an excellent Player! **(48K AS)**

DDT/HOURGLASS/DISK DUMP/INPUT-SCREEN/SUPER-WRITER . . . (Intro Price: $17.95 + Shipping)
Featured in Vol. #3, Issue #5 . . Price Expires Nov. 15, 1982 . . . **New Price $22.95 +** Shipping)

nibble® software

DDT is a set of Fast Utilities for Relocating and Imbedding programs above DOS Buffers and Recapturing Tracks 1 and 2 from your Disk. **(48K AS)**

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Indexed Files Made Easy (Cont.)

If one has a large inventory file where the **four-digit part number** is to be the search field or "key", then a one hundred record index structure might be better used. As the part number consists of numeric characters, each of the one hundred index records could cover a different numeric range.

For example, Index Record One could be used for part numbers "0000" to "0099"; Index Record Two for part number "0100" to "0199", et cetera. Changes to the PRICE DEMO program to accommodate this new index structure would be as follows: The OPEN ROUTINE of line 20000 would create one hundred index records, rather than twenty-eight; and statements 8200 and 6200 which determine the index record, **NUM**, to be used for a given part number would become **XY$ = LEFT$ (NAME$,2): NUM = VAL(XY$)**.

A larger PRICE LIST file calls for yet another index structure. To achieve better search accuracy on the **larger file** of alphanumeric keys, **two index records** for each letter category of item names, rather than one index record, could be created. The OPEN ROUTINE of **line 20000** would be modified to create fifty-four index records; and **lines 8200** and **6200** would become **NUM = ASC(LEFT$ (NAME$,1)) - 64: IF MID$(NAME$,2,1)>"M" THEN NUM + 28.** These modifications would use Index Record One for item names "A" through "AM", and Index Record Twenty-nine for item names "AN" through "AZ".

This should provide you with the fundamental program logic needed to maintain an indexed file of alphanumeric keys. The logic is adaptable to a wide range of file sizes and contents. An index may be built to pinpoint a record on file or merely cut the sequential search time in half. The choice of the index algorithm is left to the reader.

```
1   REM   ************************
2   REM   *      PRICE DEMO      *
3   REM   *   BY CHRIS EXNER     *
4   REM   * COPYRIGHT (C) 1982 *
5   REM   * BY MICRO-SPARC INC *
6   REM   * LINCOLN, MA. 01773 *
7   REM   ************************
100  TEXT :D$ =  CHR$ (4)
200  PRINT D$"OPEN PRICE LIST,L40"
300  ONERR  GOTO 20000
400  PRINT D$"READ PRICE LIST,R0"
450  INPUT RCDCTR
500  POKE 216,0: PRINT D$
600  REM  *** DISPLAY MENU OF CHOICES
700  HOME : PRINT  TAB( 10);"**  MAIN MENU  **"
800  VTAB 7: PRINT "1. ENTER A PRICE RECORD"
900  VTAB 9: PRINT "2. FIND A PRICE RECORD"
1000  VTAB 11: PRINT "3. EXIT PROGRAM"
1100  PRINT D$: VTAB 15: INPUT "YOUR CHOICE: ";C
1200  IF C = 1 THEN  GOSUB 2000: GOTO 700
1300  IF C = 2 THEN  GOSUB 7000: GOTO 700
1400  IF C <  > 3 THEN  GOTO 1100
1500  PRINT D$"CLOSE PRICE LIST"
1600  END
2000  REM  *** ENTER A PRICE RECORD
2100  HOME : PRINT  TAB( 10);"** ENTER A RECORD **"
2200  VTAB 7: INPUT "ENTER ITEM NAME: ";NAME$
2300  IF  LEN (NAME$) = 0 OR  LEN (NAME$) > 20 THEN 2200
2400  VTAB 9: INPUT "ENTER ITEM PRICE: ";PRICE$
2500  IF  LEN (PRICE$) = 0 OR  LEN (PRICE$) > 10 THEN 2400

2600  VTAB 22: INPUT "ANY CORRECTIONS?(Y/N) ";ANS$
2700  IF ANS$ <  > "Y" AND ANS$ <  > "N" THEN 2600
2800  IF ANS$ = "Y" THEN  GOTO 2100
2900  GOSUB 8000: REM  FIND ROUTINE
3000  IF FOUND = 0 THEN  GOTO 4000
3100  REM  *** RE-WRITE RECORD
3200  PRINT D$"WRITE PRICE LIST,R";PTR
3300  PRINT NAME$: PRINT PRICE$: PRINT BPTR: PRINT FPTR
3400  REM  *** CONTINUE ENTERING RECORD?
3500  PRINT D$: VTAB 22: INPUT "ENTER ANOTHER RECORD?(Y/N)
      ";ANS$
3600  IF ANS$ <  > "Y" AND ANS$ <  > "N" THEN 3500
3700  IF ANS$ = "Y" THEN 2100
3800  RETURN
4000  REM  *** ENTER A NEW RECORD
4100  REM  *** UPDATE THE RECORD COUNTER IN THE HEADER (0)
      RECORD
4200  PRINT D$"READ PRICE LIST,R0"
4300  INPUT RCDCTR
4400 RCDCTR = RCDCTR + 1
4500  PRINT D$"WRITE PRICE LIST,R0"
4600  PRINT RCDCTR
4700  REM  *** WRITE NEW RECORD
4800  PRINT D$"WRITE PRICE LIST,R";RCDCTR
4900  PRINT NAME$: PRINT PRICE$: PRINT WBPTR: PRINT WFPTR
5000  REM  *** UPDATE POINTERS OF THE RECORDS BETWEEN WHIC
      H THE NEW RECORD FITS
5100  IF WBPTR = 0 THEN  GOTO 5600
5200  PRINT D$"READ PRICE LIST,R";WBPTR
5300  INPUT N$,P$,B,F
5400  PRINT D$"WRITE PRICE LIST,R";WBPTR
5500  PRINT N$: PRINT P$: PRINT B: PRINT RCDCTR
5600  IF WFPTR = 0 THEN  GOTO 6100
5700  PRINT D$"READ PRICE LIST,R";WFPTR
5800  INPUT N$,P$,B,F
5900  PRINT D$"WRITE PRICE LIST,R";WFPTR
6000  PRINT N$: PRINT P$: PRINT RCDCTR: PRINT F
6100  REM  *** UPDATE THE ALPHA INDEX RECORD
6200 NUM =  ASC ( LEFT$ (NAME$,1)) - 64
6210  IF NUM < 0 THEN NUM = 27
6220  IF NUM > 26 THEN NUM = 28
6300  PRINT D$"WRITE PRICE LIST,R";NUM
6400  PRINT RCDCTR
6500  GOTO 3500: REM  ASK 'ENTER ANOTHER RECORD' QUESTION
7000  REM  *** FIND A PRICE RECORD
7100  HOME : PRINT  TAB( 10);"** FIND A PRICE RECORD **"
7200  VTAB 7: INPUT "ENTER ITEM NAME: ";NAME$
7300  GOSUB 8000: REM  FIND A RECORD ROUTINE
7400  PRINT D$: IF FOUND = 0 THEN  VTAB 10: PRINT "(RECORD
      NOT FOUND)": GOTO 7700
7500  VTAB 10: PRINT "ITEM: ";RNAME$
7600  VTAB 12: PRINT "PRICE: ";RPRICE$
7700  VTAB 22: INPUT "FIND ANOTHER RECORD?(Y/N) ";ANS$
7800  IF ANS$ <  > "Y" AND ANS$ <  > "N" THEN  GOTO 7700
7850  IF ANS$ = "Y" THEN  GOTO 7100
7900  RETURN
8000  REM  ** FIND RECORD ROUTINE
8010  REM  ** BPTR IS BACKWARD PTR
8020  REM  ** FPTR IS FORWARD PTR
8050 FOUND = 0:WBPTR = 0:WFPTR = 0
8060  IF RCDCTR < 29 THEN  RETURN
8070 L =  LEN (NAME$)
8100  REM  *** READ APPROPRIATE INDEX RECORD
8200 NUM =  ASC ( LEFT$ (NAME$,1)) - 64
8250  IF NUM < 1 THEN NUM = 27
8275  IF NUM > 26 THEN NUM = 28
8300  PRINT D$"READ PRICE LIST,R";NUM
8400  INPUT PTR
8450  IF PTR = 0 THEN PTR = RCDCTR
8600  REM  *** READ RECORDS UNTIL KEY MATCH IS MADE, OR PO
      SITION WHERE RECORD  SHOULD BE IS DETERMINED.
8700  PRINT D$"READ PRICE LIST,R";PTR
8800  INPUT RNAME$,RPRICE$,BPTR,FPTR
8900  IF  LEFT$ (RNAME$,L) = NAME$ THEN FOUND = 1: RETURN

9000  IF  LEFT$ (RNAME$,L) < NAME$ THEN  GOTO 9300
9100 WFPTR = PTR: IF WBPTR <  > 0 OR BPTR = 0 THEN  RETURN

9200 PTR = BPTR: GOTO 8600
9300 WBPTR = PTR: IF WFPTR <  > 0 OR FPTR = 0 THEN  RETURN

9400 PTR = FPTR: GOTO 8600
20000  REM  *** CREATE A NEW FILE.
20010  REM  RECORD 0 CONTAINS
20020  REM  THE NUMBER OF RECORDS
20030  REM  IN THE FILE.
20040  REM  RECORD 1-28 ARE THE
20050  REM  INDEX RECORDS CONTAINING
20060  REM  THE RECORD POINTERS TO
20070  REM  RECORDS OF THE APPROPRIATE
20080  REM  KEY.  INDEX RECORD 1 POINTS
20090  REM  TO A RECORD WHOSE KEY
20100  REM  BEGINS WITH "A"; INDEX 2
20110  REM  POINTS TO A "B" RECORD ETC.
20120  REM  RECORD 29 AND UP ARE
20130  REM  DATA RECORDS.
20200  PRINT D$"CLOSE PRICE LIST"
20250  HOME : VTAB 7: PRINT "CREATING PRICE LIST..."
20300  PRINT D$"OPEN PRICE LIST,L40"
20400  FOR I = 1 TO 28
20500  PRINT D$"WRITE PRICE LIST,R";I
20600  PRINT 0
20700  NEXT I
20750 RCDCTR = 28
20800  PRINT D$"WRITE PRICE LIST,R0"
20900  PRINT RCDCTR
21000  GOTO 500: REM  RETURN TO MAIN MENU
```


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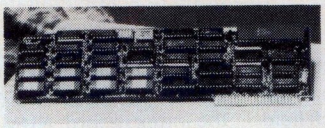

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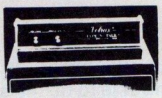

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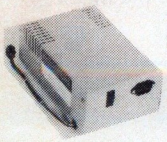

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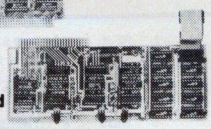

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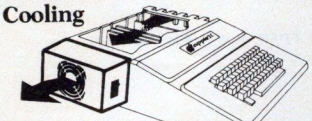

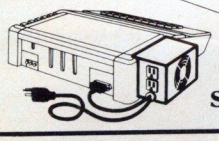

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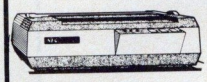

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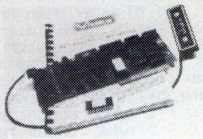

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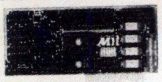

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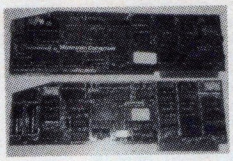

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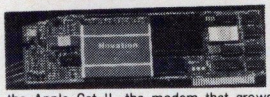

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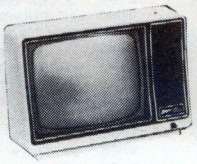

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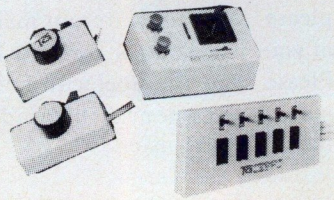

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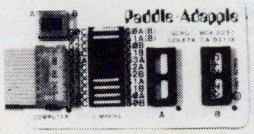

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APPLE VISICORNER

"What If" We Don't Make the Launch Date?

by Jim Englander
InterCalc Users Group
P.O. Box 254
Scarsdale, NY 10583

In this issue we are going to dive right into an application that affects all of us at one time or another — the forward planning that goes into the launch of a product or products (or the commencement of some other schedule that has cash implications). The introduction is date sensitive as far as the annual budget is concerned. If the new project slips a month then we may not have all the expenses of the launch. But we also do not have the income.

Take an example close to my heart — the planning of the opening of a chain of stores. Each store has a projected "going" income (the income volume that it is expected to produce after the startup period). Each month during startup the store is expected to contribute revenue at a fixed percentage of the going rate. And of course, the revenue targets for the overall chain are driven by the contribution from existing individual stores and the expected volume from the planned stores.

In a planning meeting, in which the store opening schedule is being discussed, the decision to allow a store to "slip" its opening should assess the effect of the income that particular store was expected to contribute. It should also assess the effect of the slippage on the annual income performance. With the techniques discussed here we develop an Apple/VisiCalc/Englander Speedy Launch Timing Analysis model to give an instant readout of launch/income results.

THE TIMING ANALYSIS

In **Fig. 1** you will see a typical report. For the sake of readability I have labeled the events as ACTIONs. They could represent product launches, new store openings or whatever. The money concerned could be entered as expenses rather than income at your preference.

The actions illustrated here are neatly consecutive, again for readability. Action 1 is in Month 1 and so on so that you can see the first income figure is a nice even slope down the model.

The figures on the right are "bring downs", i.e. not-entered-data, and are shown for reference. You would probably not print them out in a report.

Now let's look at the assumptions, and where they are entered.

THE WORK AREA

In **Fig. 2** you can see the work area. This is the space in which VisiCalc makes it's first analysis. From left to right, the columns are: **GOING INCOME** (the after-startup rate of contribution); **INTRO MONTH** (the month of the year that the project will start and open), a **TITLE** column to differentiate the projects, and then Twelve Monthly Columns. **The number on Row 2 is essential.** If you insert Jan,

continued on page 177

Fig 1. The Timing Analysis Printout

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
16								ANALYSIS OF LAUNCH TIMING.								
17																
18	GOING	INTRO		MONTH	MONTH	MONTH	MONTH	MONTH	MONTH	MONTH	MONTH	MONTH	MONTH	MONTH	MONTH	TOTAL
19	INCOME	MONTH		1	2	3	4	5	6	7	8	9	10	11	12	YEAR
20																
21	500	1	ACTION	50	100	150	200	250	300	500	500	500	500	500	500	4050
22	4300	2	ACTION	0	430	860	1290	1720	2150	2580	4300	4300	4300	4300	4300	30530
23	1200	3	ACTION	0	0	120	240	360	480	600	720	1200	1200	1200	1200	7320
24	800	4	ACTION	0	0	0	80	160	240	320	400	480	800	800	800	4080
25	1650	5	ACTION	0	0	0	0	165	330	495	660	825	990	1650	1650	6765
26	900	6	ACTION	0	0	0	0	0	90	180	270	360	450	540	900	2790
27	2560	7	ACTION	0	0	0	0	0	0	256	512	768	1024	1280	1536	5376
28	1270	8	ACTION	0	0	0	0	0	0	0	127	254	381	508	635	1905
29	4500	9	ACTION	0	0	0	0	0	0	0	0	450	900	1350	1800	4500
30																
31			TOTAL	50	530	1130	1810	2655	3590	4931	7489	9137	10545	12128	13321	67316
32			PCENT	0.07	0.79	1.68	2.69	3.94	5.33	7.33	11.13	13.57	15.66	18.02	19.79	100

Fig 2 - The Work Area.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1	GOING	INTRO		MONTH	MONTH	MONTH	MONTH	MONTH	MONTH	MONTH	MONTH	MONTH	MONTH	MONTH	MONTH	TOTAL
2	INCOME	MONTH		1	2	3	4	5	6	7	8	9	10	11	12	YEAR
3																
4	500	1	ACTION	1	2	3	4	5	6	7	8	9	10	11	12	
5	4300	2	ACTION	0	1	2	3	4	5	6	7	8	9	10	11	
6	1200	3	ACTION	0	0	1	2	3	4	5	6	7	8	9	10	
7	800	4	ACTION	0	0	0	1	2	3	4	5	6	7	8	9	
8	1650	5	ACTION	0	0	0	0	1	2	3	4	5	6	7	8	
9	900	6	ACTION	0	0	0	0	0	1	2	3	4	5	6	7	
10	2560	7	ACTION	0	0	0	0	0	0	1	2	3	4	5	6	
11	1270	8	ACTION	0	0	0	0	0	0	0	1	2	3	4	5	
12	4500	9	ACTION	0	0	0	0	0	0	0	0	1	2	3	4	
13																
14																

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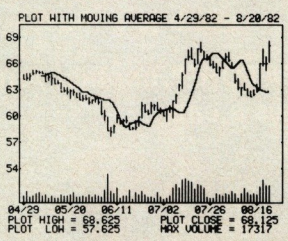

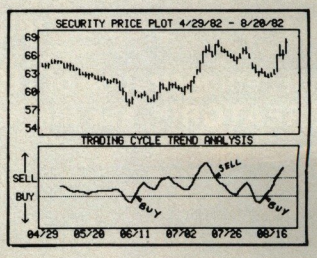

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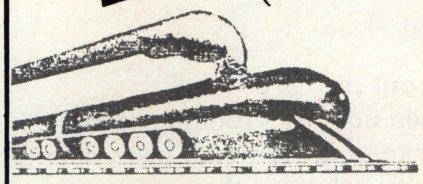

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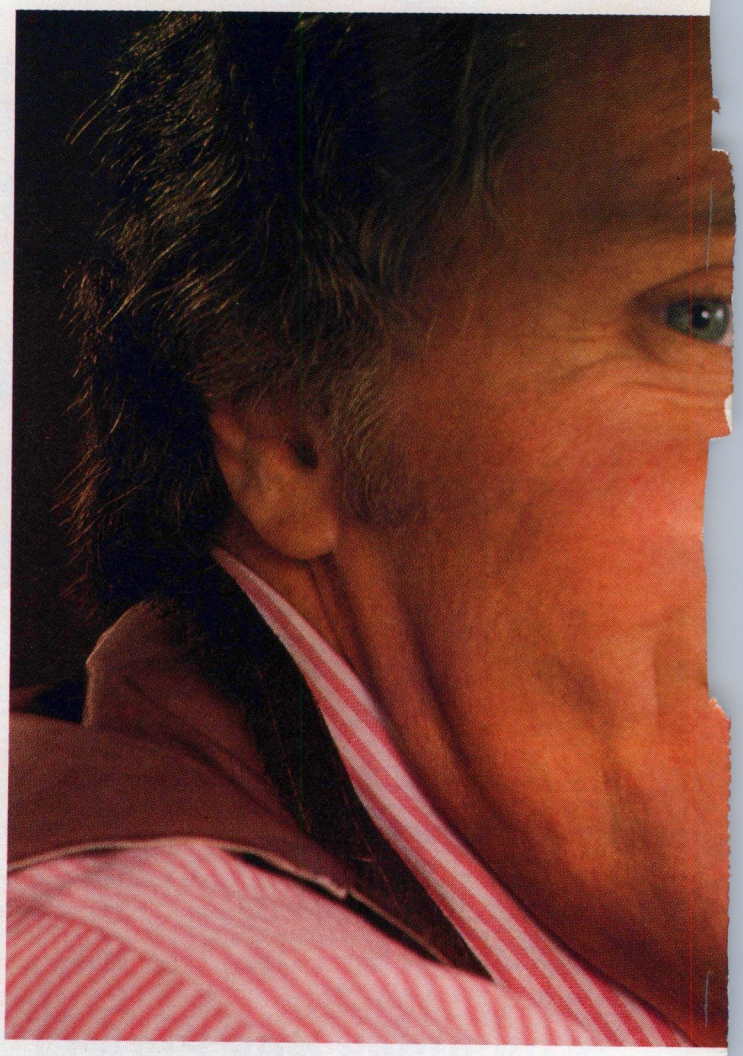

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"What If" We Don't Make the Launch Date? (Cont.)

Feb and so on, you must still have the numeric value for each month on the next line.

The "what-iffing" is done with the first and second columns. To examine the implications of a launch date change, the month number is changed in Column B and a change in the projected going rate of revenue is done in Column A.

Now look at the inset, **Fig. 3**. This is the other assumption area. It is an **@LOOKUP** table, with the months down the left side, and the percentage of going rate that can be expected during the startup. Once the way in which the model works is understood, it will be seen that this table can be extended to cover many months of variables. We have illustrated a straight line revenue contribution, showing ten percent per month improvement until the sixth month, when revenue jumps to the going rate.

So how does it all work?

Fig 3. The @LOOKUP table

	Q	R	S
1		LOOKUPTABLE	
2			
3		Ø	Ø.ØØ
4		1	Ø.1Ø
5		2	Ø.2Ø
6		3	Ø.3Ø
7		4	Ø.4Ø
8		5	Ø.5Ø
9		6	Ø.6Ø
1Ø		7	1.ØØ
11		8	1.ØØ
12		9	1.ØØ
13		1Ø	1.ØØ
14		11	1.ØØ
15		12	1.ØØ

THE ANALYSIS

The work area simply looks at the month number and compares it with the Column B start date. The formula in the first month is:

@IF(B4=D2,B4,0)

If **B4**, the projected start date, is the same as **D2**, the number of the month, then use the number of the month; otherwise use zero.

The formula is slightly different in the second month, Column **E**:

@IF(B4=E2,1,@IF(D4<1,0,D4+1)

This formula uses the information gained in the **preceding** formula to identify the "value" of the figure to be entered. If **B4** is equal to **E2**, the month number, fine, we know it is a start month and we enter a **1**. However if **B4** does **not** equal **E2**, then we execute the second part of the formula. If **D4** (the preceding month figure) is less than one, insert **0**; otherwise add **one** to the preceding month. This formula is replicated across the columns, and then down the columns. Take great care on the **R** and **N** designations while replicating.

And that is what the top area of the model does. It just establishes and gives a value to the various months for each Action. Then we can look up that value to establish the contribution level for that month.

continued on next page

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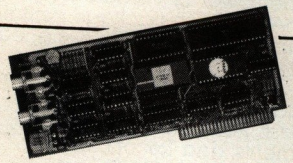

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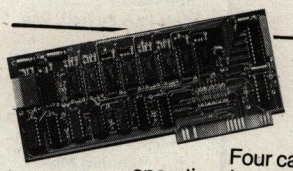

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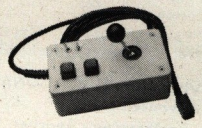

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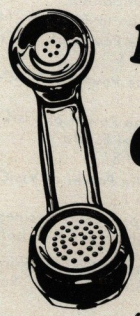

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"What If" We Don't Make the Launch Date? (Cont.)

THE FORMULAE IN THE REPORT

There are really only two significant formulae in the report model. The first formula is for the first month of the year, and the second is for all remaining months. The formula entry in Column **D** on row **21** is:

@IF(D4=B4, (@LOOKUP(D4,R3...R15) *A21),0)

If **D4** equals **B4**, this means that the start month in the "what-if" area equals the value that VisiCalc has calculated for the month in the "work" area. Then the model looks up the calculated value in **D4** in the **@LOOKUP** table. It then multiplies **A21**, the going-month value, by the percentage which is retrieved. If, on the other hand, **D4** does not equal **B4**, then insert a zero.

The formula in the succeeding months is a doozy! Look at it in all its glory and then we will break it down:

@IF(D4<1,@IF(B4=E2,(A4*@LOOKUP (E4,R3...R15)),0), @LOOKUP(E4,R3...R15)*A4)

There is a lot going on here! Let's break it down into its component parts. There are three formulae all working together.

We should recall that the **@IF** statement in VisiCalc is **"@IF(1v,v1,v2)"** or if **1v** (logical value) is **TRUE**, use value **1**, if **FALSE** then use value **2**.

The **1v** in this case is **(D4<1)**, i.e. if **D4** is less than **1**. If the expression is TRUE we are going to execute **v1**, which is the following part of the formula:

@IF(B4=E2,(A4*@LOOKUP (E4,R3...R15)),0)

This is of course yet another **IF** statement (nested IFs are a neat if mentally taxing feature of VisiCalc!). So if the original **1v (D4<1)** was **TRUE**, VisiCalc will now proceed to check if another **1v** is **TRUE**, **(B4=E2)**. If it is TRUE the model will **LOOKUP E4**, the month value, and again multiply the going income by the returned percentage. If it is **not TRUE**, or **FALSE**, then VisiCalc merely inserts a zero.

The original **1v** could also have been FALSE, or **D4** could have been **1** or more than **1**. In this case VisiCalc would have proceeded to execute **v2**, or the last part of the formula:

@LOOKUP(E4,R3...R15)*A4)

which must be pretty obvious by now!

So that's it. The @SUMming and percentages to round out the report are easy (we hope!).

This is truly a useful function. It can be used for all kinds of projecting work. It is not hard to imagine other kinds of "what-if" reports. Let's say we were not interested in months, per se, but interested in other "vertical" options such as price options or cost options.

INTERCALC — WHAT IS THAT?

The users group to which I belong, which publishes SpreadSheet, which I edit, has changed it's name. We did it because the membership (now over 1,200) uses all kinds of machines to accomplish their electronic spreadsheet aims. We use VisiCalc of course, but also Supercalc, the CP/M program, and others. Membership is still $25.00 and I'll sign you up if you write me at the above address (with a check of course). The real reason for bringing all this up is in fact that I am now in a position to answer "cross-machine" questions.

InterCalc owns an IBM PC, a Xerox 820 (eight inch) and of course three Apples. We have them all talking to one another, and have identified the differences and similarities. Anyone with questions that I can answer either in this column, or directly (please send stamped, self-addressed envelope with inquiry), just write them down with a copy to NIBBLE and I'll try to help.

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        M) erge From File
        P) rint Text
        Q) uit Program
        S) end Text
        T) oggle
          A) lternate Drive (1/2)
          B) aud Rate (110/300)
          C) apture (ON/OFF)
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          T) ransmit
        W) rite To File
            Which    ?( Press RETURN to Abort )
```

```
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Lines  = 15         Sp. Char. ON        Duplex    FULL
Baud   = 300                            Carrier   ON
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Please Sign-on
♦ID ABC123

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Time on 12:35:41
♦
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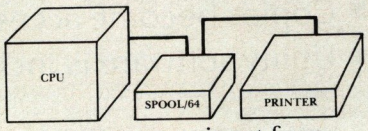

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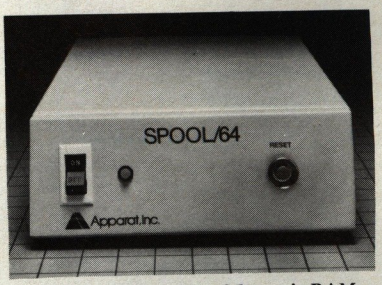

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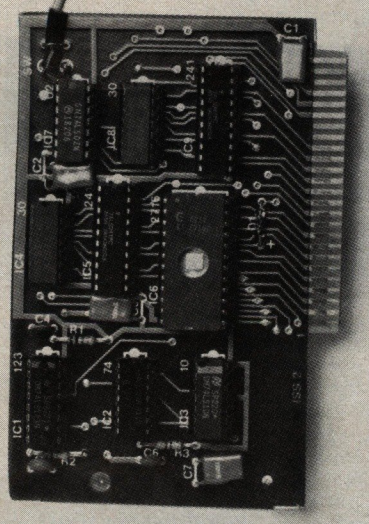

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TIPS 'N TECHNIQUES

Apple Scroller

by Bill Fortenberry
2906 36 Ave.
Meridan, MS 39301

One of the most confusing things to the beginning assembly language programmer has to be the subject of memory addressing. Out of the nine methods offered by the 6502 (Apple processor chip), indirect and indexed addressing are probably the most difficult to grasp. The advantage of these two forms is the ability to handle large amounts of data with a small amount of code and as we all know, compact machine code is spelled S-P-E-E-D.

INDEXED ADDRESSING

Indexed addressing can be directly compared to using **arrays** in BASIC. You have a starting point (the base address) and a pointer into the array (the index). For example, the Applesoft statement **X=A(5)** will cause the computer to find the **fifth item** in the array you named **A** and store that number in the variable **X**. In assembly language this would translate to something like **LDA $305,Y** which tells the computer to go to the memory location **$305 PLUS** whatever is in the **Y** register and store this value in the accumulator. In the above example, if the **Y** register contained the value **$03**, the Accumulator would be loaded with whatever is in location **$308 ($305 + $03)**.

INDIRECT ADDRESSING

Indirect addressing has no direct counterpart in BASIC, although it can easily be illustrated. Say you want to go visit Jim but you don't know where Jim lives. You do know that Fred knows where Jim lives, so you go to Fred's and ask him where Jim lives and then head over to Jim's. Because you didn't know Jim's exact address, you had to go **INDIRECTLY** through Fred. In short, indirect addressing means that **you go to one memory address and in that location you find the address of the number you really want.**

THE SCROLL DEMO

The following program uses both of these methods together to **scroll** the text screen **right**, **left**, or **down**. Since the Apple screen consists of known memory locations (this information is found on page 16 of the reference manual), we can move the data in these locations anywhere we want.

The program uses an array that holds the screen addresses. These addresses are the left column of the screen only, but by adding an index to this address, all forty columns can be addressed. Because the 6502 only allows indirect indexing from the zero page, all addresses must be pulled from the array and moved to the zero page before being used. All that remains is to pull the data from one screen location and move it to the next one.

This program was assembled at location **$6000**. To use the program, just enter the system monitor and type in the hex numbers in the left column. **(For directions on entering machine code into your Apple see the instructions in the Letters column of this issue.)** You can then save them with the command **BSAVE SCROLL,A $6000,L 258**. The program is executed with the CALL statement. There are three addresses to call, depending on the direction you want the screen to go. **To scroll down, type CALL 24576. Left-Scrolling** would be exercised with **CALL 24658**, and **CALL 24721** will **scroll right**.

If you call the program once, only one row (or column) will scroll off the screen. This allows you to print, scroll, print, scroll until a new screen appears.

To clear the whole screen, use a statement such as: **FOR I=1 TO 40:CALL 24657:NEXT I.**

```
SOURCE FILE: SCREEN SCROLL
00FF:                1 A1      EQU  $FF
00FE:                2 A2      EQU  $FE
00FD:                3 A3      EQU  $FD
00FC:                4 A4      EQU  $FC
----- NEXT OBJECT FILE NAME IS SCREEN SCROLL
6000:                5          ORG  $6000
6000:                6 *********************************
6000:                7 *  SCREEN SCROLL DOWN
6000:                8 *  BY BILL FORTENBERRY
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6000:               10 *  APPLE ASSEMBLER (DOS TOOL KIT)
6000:               11 *
6000:               12 *          ENTRY POINTS
6000:               13 *   SCROLL                  ADDRESS
6000:               14 *    DOWN                    $6000
6000:               15 *    LEFT                    $6052
6000:               16 *    RIGHT                   $6091
6000:               17 *********************************
6000:               18 * START OF SCROLL DOWN
6000:A2 00          19 SETUP   LDX  #0
6002:BD D2 60       20         LDA  DATA,X     ;SET BEGINNING ADRESSES
6005:85 FF          21         STA  A1
6007:E8             22         INX
600B:BD D2 60       23         LDA  DATA,X
600B:85 FE          24         STA  A2
600D:E8             25         INX
600E:BD D2 60       26         LDA  DATA,X
6011:85 FD          27         STA  A3
6013:E8             28         INX
6014:BD D2 60       29         LDA  DATA,X
6017:85 FC          30         STA  A4
6019:E8             31         INX
```

The Shape, LightSabre Battle, Price Demo, Scroll, and Lower Case Writer are available on diskette for an introductory price of $17.95 plus $1.50 shipping/handling ($2.50 outside the U.S.) from NIBBLE, P.O. Box 325, Lincoln, MA 01773. Offer expires Jan. 31, 1983.

continued on next page

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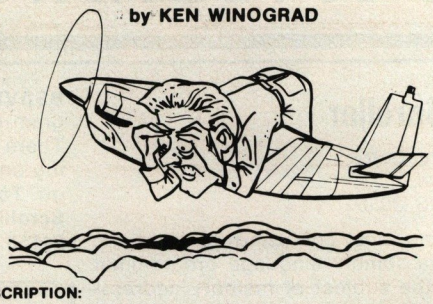
Apple Scroller (Cont.)

```
601A:A0 00        32 START1  LDY  #0
601C:B1 FC        33 CHANGE  LDA  (A4),Y     ;DROP CHAR
601E:91 FE        34         STA  (A2),Y     ;ONE LINE
6020:C8           35         INY
6021:C0 28        36         CPY  #40        ;WHOLE ROW?
6023:D0 F7        37         BNE  CHANGE     ;DO MORE
6025:18           38         CLC
6026:A5 FD        39         LDA  A3
6028:65 FC        40         ADC  A4
602A:C9 04        41         CMP  #04        ;IS ADDRESS = $400
602C:F0 17        42         BEQ  TROW       ;LAST ROW?
602E:A5 FD        43         LDA  A3
6030:85 FF        44         STA  A1
6032:A5 FC        45         LDA  A4
6034:85 FE        46         STA  A2         ;TOP TO BOTTOM
6036:BD D2 60     47         LDA  DATA,X     ;GET NEW ADDRESS
6039:85 FD        48         STA  A3
603B:E8           49         INX
603C:BD D2 60     50         LDA  DATA,X
603F:85 FC        51         STA  A4
6041:E8           52         INX
6042:4C 1A 60     53         JMP  START1     ;DO NEW ROW
6045:A9 A0        54 TROW    LDA  #160       ;ASCII BLANK
6047:A0 00        55         LDY  #0
6049:99 00 04     56 ERASE   STA  $400,Y     ;BLANK TOP ROW
604C:C8           57         INY
604D:C0 28        58         CPY  #40
604F:D0 F8        59         BNE  ERASE
6051:60           60         RTS             ;ALL DONE
6052:             61 * SCROLL RIGHT TO LEFT
6052:A2 00        62 START2  LDX  #0
6054:BD D2 60     63 GETAD   LDA  DATA,X     ;GET ADDRESS
6057:85 FF        64         STA  A1
6059:E8           65         INX
605A:BD D2 60     66         LDA  DATA,X
605D:85 FE        67         STA  A2
605F:E8           68         INX
6060:A0 00        69         LDY  #0         ;SETUP POINTERS
6062:8C D0 60     70         STY  I
6065:C8           71         INY
6066:8C D1 60     72         STY  J          ;INITILIZE POINTERS
6069:AC D1 60     73 LEFT    LDY  J
606C:B1 FE        74         LDA  (A2),Y     ;MOVE LETTER LEFT
606E:AC D0 60     75         LDY  I
6071:91 FE        76         STA  (A2),Y
6073:EE D0 60     77         INC  I          ;BUMP POINTERS
6076:EE D1 60     78         INC  J
6079:AD D1 60     79         LDA  J
607C:C9 28        80         CMP  #40        ;CHECK FOR LAST COLUMN
607E:D0 E9        81         BNE  LEFT
6080:A9 A0        82         LDA  #160       ;ASCII BLANK
6082:AC D0 60     83         LDY  I
6085:91 FE        84         STA  (A2),Y     ;BLANK OUT RIGHT COL
6087:A5 FF        85         LDA  A1
6089:18           86         CLC
608A:65 FE        87         ADC  A2
608C:C9 04        88         CMP  #04        ;CHECK FOR TOP LINE
608E:D0 C4        89         BNE  GETAD
6090:60           90         RTS             ;ALL DONE
6091:             91 * SCROLL LEFT TO RIGHT
6091:A2 00        92 START3  LDX  #0
6093:BD D2 60     93 FINDAD  LDA  DATA,X     ;GET ADDRESS OF ROW
6096:85 FF        94         STA  A1
6098:E8           95         INX
6099:BD D2 60     96         LDA  DATA,X
609C:85 FE        97         STA  A2
609E:E8           98         INX
609F:A0 26        99         LDY  #38        ;SET POINTERS
60A1:8C D0 60    100         STY  I
60A4:C8          101         INY
60A5:8C D1 60    102         STY  J
60A8:AC D0 60    103 RIGHT   LDY  I
60AB:B1 FE       104         LDA  (A2),Y     ;MOVE LETTER RIGHT
60AD:AC D1 60    105         LDY  J
60B0:91 FE       106         STA  (A2),Y
60B2:CE D0 60    107         DEC  I          ;BUMP POINTERS DOWN
60B5:CE D1 60    108         DEC  J
60B8:AD D1 60    109         LDA  J
60BB:C9 00       110         CMP  #0         ;LAST COL?
60BD:D0 E9       111         BNE  RIGHT
60BF:AC D1 60    112         LDY  J
60C2:A9 A0       113         LDA  #160       ;ASCII BLANK
60C4:91 FE       114         STA  (A2),Y     ;BLANK LEFT COL
60C6:A5 FF       115         LDA  A1
60C8:18          116         CLC
60C9:65 FE       117         ADC  A2
60CB:C9 04       118         CMP  #04        ;LAST ROW?
60CD:D0 C4       119         BNE  FINDAD
60CF:60          120         RTS             ;ALL DONE
60D0:            121 * TEMP STORAGE
60D0:00          122 I       DFB  $00
60D1:00          123 J       DFB  $00
60D2:            124 * SCREEN ADDRESS TABLE
60D2:07 D0 07    125 DATA    DFB  $07,$D0,$07,$50
60D5:50
60D6:06 D0 06    126         DFB  $06,$D0,$06,$50,$05,$D0,$05,$50
60D9:50 05 D0
60DC:05 50
60DE:04 D0 04    127         DFB  $04,$D0,$04,$50,$07,$A8,$07,$28
60E1:50 07 A8
60E4:07 28
60E6:06 A8 06    128         DFB  $06,$A8,$06,$28,$05,$A8,$05,$28
60E9:28 05 A8
60EC:05 28
60EE:04 A8 04    129         DFB  $04,$A8,$04,$28,$07,$80,$07,$00
60F1:28 07 80
60F4:07 00
60F6:06 80 06    130         DFB  $06,$80,$06,$00,$05,$80,$05,$00,$04,$80,$04,$00
60F9:00 05 80
60FC:05 00 04
60FF:80 04 00
```


AIR NAVIGATION TRAINER

by KEN WINOGRAD



GENERAL DESCRIPTION:

AIR NAVIGATION TRAINER (ANT) is a navigation simulator for an APPLE II/II+ computer* (48K, DOS 3.3, Applesoft in ROM or RAM Card). ANT will eliminate many of the mysteries of air navigation for the student pilot, as well as improve the instrument training of experienced pilots. At all times (if desired) it is possible to view the ground track that results from actions taken in the cockpit. Experienced pilots can practice holding patterns on a VOR or NDB fix (or intersection) while viewing the effects of the wind (adjustable with paddles) on the ground track. Four pre-programmed simulations and a VOR Demo program are also included. All this and much more for a tiny fraction of the cost of equivalent flight time.

• *See Review in INFOWORLD (Sept. 20, 1982)* •

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- Price is only $80! Includes diskette with Macro Assembler and sample programs, a 100-page Reference Manual, and a Programmer Reference Card. (Registered Owners of S-C Assembler II Version 4.0 may purchase the upgrade package for only $27.50).

Commands

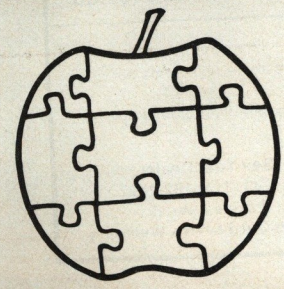
Source:	NEW, LOAD, SAVE, TEXT, HIDE, MERGE
Editing:	LIST, FIND, EDIT, DELETE, REPLACE, COPY, RENUMBER
List Control:	FAST, SLOW, PRT,"
Object:	ASM, MGO, VAL, SYMBOLS
Miscellaneous:	AUTO, MANUAL, INCREMENT, MEMORY, MNTR, RST, USR

All Apple Monitor Commands
All Apple DOS Commands

Assembler Directives

.OR	Origin
.TA	Target Address
.TF	Target File
.IN	Include File
.EN	End of Program
.EQ	Equate
.DA	1- or 2-byte Data
.HS	Hex String
.AS	ASCII String
.AT	ASCII Terminated
.BS	Block Storage
.TI	Title
.LIST	Listing Options
.PG	Page Eject
.DO, .ELSE, .FIN	Conditional Assembly
.MA	Macro Definition
.EM	End of Macro
.US	User Directive

Already well-known for excellent support, S-C Software Corporation pledges to continue development of new features, and to help owners gain the maximum benefit from the S-C Macro Assembler. In addition to telephone consultation for registered owners, a monthly newsletter is available by subscription (currently $15/year). The "Apple Assembly Line" covers items of interest to assembly language programmers at all levels, and has helped many to advance their programming skills.



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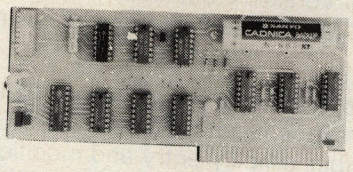

- Twenty-seven page operating manual included with many examples of programs to use with your Apple in any configuration.
- Includes disk containing a DOS Dater and many other time oriented utilities plus over 25 user contributed programs at no extra cost.

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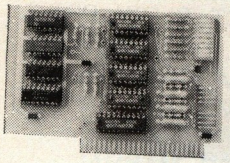

- Complete 16 volce music synthesizer on one card. Just plug it into your Apple, connect the audio cable (supplied) to your stereo and boot the disk supplied and you are ready to input and play songs.
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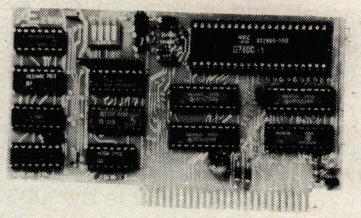

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Lower Case Letters (With Hi-Res Graphics)

by James Totten
Software Plus
1347 Monmouth Dr. Burlington, Ontario
Canada, L7P 3J7

There are various ways to obtain lower case letters on the Apple II and Apple II Plus computers. However, almost all of these require buying new RAM or ROM boards, or expensive software. But remember, I said **almost** all.

This idea came to me while writing a game in Hi-Res graphics. I needed letters and numbers on the top of the screen, and so I tried to figure out how to combine text and Hi-Res. But I suddenly realized: Why bother with trying to make a graphics/text combination? Why not just do with the letters what I had done with the aliens? So, I sat down and 'wrote' a **master 85-character shape table**.

THE MASTER SHAPE TABLE

This shape table contains literally every character present on the Apple's keyboard. Lower case letters are defined as standard, and upper case letters are tagged on the end of the table. This is because you'll probably use lower case more often than you will use upper case. **Each character is in its proper ASCII position (the ASCII character 43 is shape number 43), and that makes using the table very easy.**

ENTERING THE SHAPES

First, type **CALL-151** to enter the Monitor. Then you can begin to enter the shape tables directly into memory by typing **4000: 58 00 B2 00 C5 00** etc. from the memory listing. (See the Letters section for more information on entering machine code into memory.)

After you've typed in the character set (whew), you can save it with **BSAVE CHARACTERS, A$4000,L1930**. Notice that the table is stored in Hi-Res **page two**. This can be changed if you wish; however you will have to alter the values in the two **POKEs** before using relocated shapes (see the demo program). You have to set **LOMEM** just past the Hi-Res page two if the shapes are to be used with a program.

Next, there is a small demo program using the shapes and full screen graphics in Hi-Res page one. When you finish analyzing the program, try some things on your own. You'll love the new letters!

THE DEMO

The demonstration program shows how the character shapes are used. This program can be modified to fit your needs, or even used as a screen printing subroutine in a major program. Again, if this is done, then **LOMEM** will have to be set just beyond Hi-Res page two. Here is a variable list:

K$ — Key pressed
D$ — DOS operator
X,Y — screen locations
UC — upper case indicator
UL — upper lock indicator
C$ — character typed from keyboard
CC — character code (ASCII — DRAW value)
L — loop counter

PROGRAM DESCRIPTION

80–130	Loads the character table into memory (if needed), and completes the necessary POKEs and variable settings.
140	Plots cursor and gets a character (C$).
160–180	Checks to see if C$ is an upper case set or an upper case lock. If set, then UC = 1 for the next character.
190–200	Checks to see if C$ is a cursor move.
210–220	Resets CC to the proper value of the shape.
230	If the character is a letter and there is no lower case restriction (UC or UL), then moves Y down by 1 line so that the letter will line up with the other characters. After drawing the character, Y is reset to its proper value.
240–260	Clears area and draws the character.
270–310	Checks to make sure that the cursor is not going above or below its maximum or minimum allowable value.

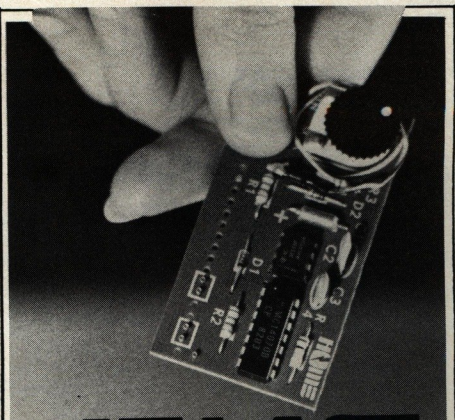
HOW TO USE THE DEMO PROGRAM

To use demo program, you must first have the character shapes in memory. However, this is taken care of by the demo program itself.

After the loading is finished, you'll be presented with a blank Hi-Res screen, and a small white line at the upper left corner. This is your cursor. It can be controlled with either arrow key (they work as they should; they will not erase any character), or by pressing any character on the keyboard. If the cursor should move past the right edge of the screen, it will reappear on the next line (on the left). The RETURN key works normally as well. A note of caution is in order, however. When the cursor reaches the bottom of the screen, it will automatically return to the top of the screen. Therefore, if you continue typing past the lower right corner of the screen, you'll begin over-printing the first line at the top of the screen.

When you wish to use an upper case letter, press the **ESC** key once. You'll hear a beep when you press the key, and then the **next letter** you type will be upper case. This will hold for only one letter. If you wish to do a string of upper case letters, **CTRL-N** will activate the upper case lock. Every letter after **CTRL N** will appear in upper case. To deactivate the upper case lock, type **CTRL-L**. Again, you'll hear a small beep and you'll return to lower case printing. You'll find that Lower Case Letters are useful for games and many other applications. Let us know the uses that you discover!

continued on page 190



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The easiest Apple assembler for beginners, yet powerful enough for experts. Combined source program editor and assembler takes full advantage of Apple features to provide a complete professional software development environment.

- Operates in any Apple II or Apple II Plus with at least 32K RAM and one Disk II drive.
- Distributed on copyable 16-sector DOS 3.3 diskette (13-sector DOS 3.2.1 version available on special request).
- Includes Quick Reference Card and a Reference manual of over 60 pages.
- Many useful examples and sample programs in the manual and on the disk.
- Assembles up to 6000 lines per minute.
- May assemble from source code in memory, or from multiple source files. Object code may be directed to memory or to standard binary disk files.

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- A memory size of 48K allows source programs of over 24,000 bytes to be handled entirely within RAM. The Language Card version allows source programs of over 32,000 bytes. Much larger programs can be edited and assembled using the "INCLUDE" and "TARGET FILE" capabilities, up to the limit of on-line disk storage.
- Programs can be edited, assembled, and tested entirely within the framework of the S-C Macro Assembler. The editor and assembler are co-resident, allowing rapid cycles of modification, re-assembly, and check-out. All DOS and Apple Monitor commands are active as well, providing a familiar interface to the standard Apple features.
- Uses its own high-speed technique to store source files, but also can read or write standard TEXT files. You can EXEC source files from another assembler, keep a library of routines on disk to EXEC into any program, or use S-C Macro Assembler to prepare EXEC files for any purpose.
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Apple Assembly Line

A newsletter dedicated to Apple assembly language programmers, published monthly since October, 1980. Includes tutorial articles for beginners, advanced techniques you can use, handy utility programs ready to type in and run, commented assembly listings of code found in DOS and the Apple ROMs.

All back issues from October, 1980, are still available. Quarterly disks are available to subscribers ($15 each) containing all the source code printed in three consecutive issues of Apple Assembly Line.

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January, 1981: How to Move Blocks of Memory; Computed GOSUB for Applesoft; an EDIT Command for S-C Assembler II.

February, 1981: Apple Noises and Other Sounds (Bell, Laser, Machine Gun, Inch-worm, Touchtone pad, Morse Code); Multiplying on the 6502.

March, 1981: A beautiful Memory Dump; Secret Things Your 6502 Can Do; Commented Listing of DOS 3.2.1 RWTS.

April, 1981: Text File I/O in Assembly Language Programs; Applesoft Internal Entry Points; Fast String Input in Applesoft; Hiding Things Under DOS; Commented Listings of DOS 3.2.1 and DOS 3.3 Formatters; Substring Search for Applesoft.

May, 1981: Hi-Res SCRN Function for Applesoft; Conquering Paddle Jitter; Tutorial about Shifting; 6502 Programming Model; Commented Listing of DOS 3.2.1 $B800-BCFF.

June, 1981: Two Fancy Tone Generators; More About Multiplying on the 6502; Commented Listing of DOS 3.3 $B800-BCFF; A Review of "Beneath Apple DOS".

July, 1981: Using Your Firmware Card in Slot 4; Screen Printer; Step-Trace Debugging Utility.

August, 1981: Finding Applesoft Line Numbers; Binary Keyboard Input; Two Ways to Compare a Byte; Random Number Generator from Integer BASIC; Commented Listing of DOS 3.3 Boot ROM.

September, 1981: Field Input Routine for Applesoft; CHGET/CHRGOT in Applesoft; A New, Fancier .AS Directive for S-C Assembler II; Commented Listing of DOS 3.3 RWTS.

October, 1981: Sifting Primes Faster and Faster; Extending the Apple Monitor; Commented Listing of DOS 3.3 $B052-B0B5, $B35F-B7FF.

November, 1981: Using Applesoft ROMS from Assembly Language; Formatted Print Subroutine; Poor Man's Disassembler; A Beginner's Lesson on Loops.

December, 1981: Applesoft Hi-Res Subroutine; Hex Constants in Applesoft; Applesoft Line Editing Aid; Improved Applesoft Fast String Input; Adding ASCII to Apple Monitor Dump; Applesoft GOTO from Assembly Language.

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April, 1982: Auto-SAVE for the Assembler; Review of AED II; Using Macros and Nested Macros; Controlling Software Configuration; Funny Noise Generator.

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June, 1982: Implementing New Opcodes Using "BRK"; New Hi-Res Function for Applesoft (HXPLOT); Bubble Sort Demo; Macro Hint; Yes/No Subroutine; My Own Little Bell; Using the Shift-Key Mod; Search for Zero-Page References; Automatic CATALOG Command; Memory Examiner.

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QD#3: Apr-May-Jun 1981	QD#7: Apr-May-Jun 1982
QD#4: Jul-Aug-Sep 1981	QD#8: Jul-Aug-Sep 1982

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2331 Gus Thomasson, Suite 125
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```
10  REM   ***********************
20  REM   * HI-RES CHAR. DEMO  *
30  REM   * BY JAMES TOTTEN    *
40  REM   * COPYRIGHT (C) 1982 *
50  REM   * BY MICRO-SPARC INC *
60  REM   * LINCOLN, MA. 01773 *
70  REM   ***********************
80 D$ =  CHR$ (13) +  CHR$ (4)
90  TEXT : HOME : PRINT : PRINT "HIGH-WRITER": PRINT :
     PRINT "BY JAMES TOTTEN": PRINT : PRINT : INVERSE
    : PRINT "NOW LOADING SHAPE TABLE FROM DISK.": PRINT

100  NORMAL
110  PRINT D$"BLOAD CHARACTERS": POKE 232,0: POKE 233,
     64
120 X = 2:Y = 5: SCALE= 1: ROT= 0
130  HGR : HCOLOR= 3: POKE  - 16302,0:UC = 0:
140  HCOLOR= 3: HPLOT X,Y + 8 TO X + 5,Y + 8: HOME : GET
     C$
150  IF C$ =  CHR$ (14) THEN  CALL  - 198:UL = 1: GOTO
     140
160  IF C$ =  CHR$ (27) THEN UC = 1: CALL  - 198: GOTO
     140
170  IF C$ =  CHR$ (12) THEN  CALL  - 198:UL = 0: GOTO
     140
180  IF C$ =  CHR$ (13) THEN  HCOLOR= 0: HPLOT X,Y + 8
      TO X + 5,Y + 8:X = 2:Y = Y + 10: GOSUB 270: GOTO
     140
190  IF C$ =  CHR$ (8) THEN  HCOLOR= 0: HPLOT X,Y + 8 TO
     X + 5,Y + 8:X = X - 7: GOSUB 270: GOTO 140
200  IF C$ =  CHR$ (21) THEN  HCOLOR= 0: HPLOT X,Y + 8
      TO X + 5,Y + 8:X = X + 7: GOSUB 270: GOTO 140
210 CC =  ASC (C$) - 31
220  IF (UL OR UC) AND ( ASC (C$) > 64 AND  ASC (C$) <
     91) THEN CC = CC + 28
230  IF ((UL = 0) AND (UC = 0)) AND ( ASC (C$) > 64 AND
      ASC (C$) < 91) THEN  HCOLOR= 0: FOR L = X TO X +
     5: HPLOT L,Y TO L,Y + 7: NEXT L: HCOLOR= 3:Y = Y +
     1: DRAW CC AT X,Y:Y = Y - 1: GOTO 250
240  HCOLOR= 0: FOR L = X TO X + 5: HPLOT L,Y TO L,Y +
     7: NEXT L: HCOLOR= 3: DRAW CC AT X,Y: IF UC THEN
     UC = 0
250  HCOLOR= 0: HPLOT X,Y + 8 TO X + 5,Y + 8:X = X + 7
     : GOSUB 270
260  GOTO 140
270  IF X > 270 THEN X = 2:Y = Y + 10
280  IF Y > 180 THEN Y = 5
290  IF X < 2 THEN X = 268:Y = Y - 10
300  IF Y < 5 THEN Y = 5
310  RETURN
```

```
*4000.478B

4000- 58 00 B2 00 C5 00 D8 00
4008- EC 00 02 01 15 01 29 01
4010- 3C 01 4F 01 62 01 75 01
4018- 8A 01 9D 01 B0 01 C3 01
4020- D6 01 E9 01 FE 01 12 02
4028- 26 02 3B 02 50 02 65 02
4030- 79 02 8D 02 A2 02 B6 02
4038- C9 02 DD 02 F1 02 06 03
4040- 19 03 2C 03 41 03 55 03
4048- 69 03 7D 03 91 03 A5 03
4050- B8 03 CC 03 DF 03 F2 03
4058- 06 04 19 04 2C 04 40 04
4060- 54 04 68 04 7C 04 8F 04
4068- A3 04 B6 04 C9 04 DD 04
4070- F1 04 05 05 1A 05 2E 05
4078- 41 05 54 05 67 05 7C 05
4080- 90 05 A3 05 B7 05 CC 05
4088- E0 05 F4 05 08 06 1C 06
4090- 30 06 43 06 57 06 6B 06
4098- 7F 06 94 06 A8 06 BC 06
40A0- D0 06 E4 06 F8 06 0D 07
40A8- 21 07 36 07 4B 07 5F 07
40B0- 74 07 49 09 1A 1B 1B 4A
40B8- 49 1A 1B 1B 4A 49 1A 1B
40C0- 1B 4A 49 02 00 09 4D 1A
40C8- 1B 1F 4A 4D 1A 1B 1F 4A
40D0- 4D 1A 1B 1B 4A 4D 02 00
40D8- 69 0D 1A 3B 3B 0A 0D 0D
40E0- 1A 1B 1B 4A 49 1A 1B 1B
40E8- 4A 49 02 00 69 0D 1A 3B
40F0- 3B 2A 2D 2D 1A 3B 3B 2A
40F8- 2D 2D 1A 3B 3B 0A 0D 0D
4100- 02 00 09 4D 1A 3F 3F 6A
4108- 4D 1A 3B 3F 4A 0D 15 1B
4110- 3F 77 69 11 00 6D 09 1A
4118- 1F 3B 4E 69 1A 1B 1F 0A
4120- 4D 11 3B 1F 73 09 2D 02
4128- 00 69 09 1A 1B 1F 6E 4D
4130- 1A 1B 3B 6A 0D 15 1B 1F
4138- 73 6D 15 00 49 0D 1A 1B
4140- 1F 0A 4D 11 1B 1B 53 49
4148- 11 1B 1B 53 49 11 00 09
4150- 4D 1A 1B 3B 6A 49 1A 1B
4158- 1B 6E 49 1A 1B 3B 4A 4D
4160- 02 00 09 4D 1A 3B 1B 4A
4168- 09 15 3B 1B 53 49 15 1B
4170- 1F 53 69 11 00 09 4D 1A
4178- 1F 1F 0E 2D 0D 1A 3F 3F
4180- 0E 2D 0D 1A 1F 1F 4E 4D
4188- 02 00 49 09 1A 1B 1F 4A
4190- 4D 1A 3F 3F 4E 4D 1A 1B
4198- 1F 4A 49 02 00 49 09 1A
41A0- 1B 1B 4A 49 1A 1B 1B 4A
41A8- 6D 1A 3B 1F 0A 6D 11 00
41B0- 49 09 1A 1B 1B 4A 49 1A
41B8- 3F 3F 4E 49 1A 1B 1B 4A
41C0- 49 02 00 49 09 1A 1B 1B
41C8- 4A 49 1A 1B 1B 4A 49 1A
41D0- 1B 3F 0A 6D 11 00 49 09
41D8- 1A 1F 1B 4A 69 1A 1B 1F
41E0- 0A 4D 11 1B 1B 73 49 11
41E8- 00 29 6D 1A 1F 1B 6E 29
41F0- 15 3B 3B 33 6D 29 1A 1F
41F8- 1B 0E 2D 0D 02 00 09 4D
4200- 1A 1B 3F 4A 4D 1A 1B 1F
4208- 4A 4D 1A 1B 1F 0A 2D 0D
4210- 02 00 29 6D 1A 1F 1B 4E
4218- 09 15 1B 3F 53 4D 11 1B
4220- 1B 33 2D 2D 15 00 2D 2D
4228- 15 3B 1B 53 09 0D 1A 3B
4230- 1F 4A 09 15 3B 1B 73 2D
4238- 0D 02 00 49 0D 1A 3B 1F
4240- 0A 0D 0D 1A 3B 1B 2E 2D
4248- 2D 1A 3B 1B 4A 69 02 00
4250- 2D 2D 15 1B 1B 33 2D 6D
4258- 1A 1F 1B 4A 09 15 3B 1B
4260- 73 2D 0D 02 00 29 6D 1A
4268- 1F 1B 6E 49 1A 3B 3F 6E
4270- 09 15 3B 1B 73 2D 0D 02
4278- 00 2D 2D 15 3B 1B 53 09
4280- 0D 1A 1B 1F 0A 4D 11 1B
4288- 1B 57 4D 11 00 29 6D 1A
4290- 1F 1B 6E 09 15 1B 3F 17
4298- 4D 29 1A 1F 1B 0E 2D 0D
42A0- 02 00 29 6D 1A 1F 1B 6E
42A8- 09 15 3B 3F 57 49 15 3B
42B0- 1B 73 2D 0D 02 00 49 09
42B8- 1A 1B 3F 0A 6D 11 1B 1B
42C0- 53 6D 11 1B 3B 57 49 11
42C8- 00 49 09 1A 1B 3F 0A 6D
42D0- 11 1B 1B 53 6D 11 1B 3B
42D8- 17 6D 09 02 00 49 2D 1A
42E0- 3B 1F 0A 6D 11 1B 1B 77
42E8- 6D 11 1B 3F 53 09 2D 02
42F0- 00 49 09 1A 1B 1B 0A 2D
42F8- 0D 1A 1B 1B 0A 2D 0D 1A
4300- 1B 1B 4A 49 02 00 6D 09
4308- 1A 1B 3F 4A 6D 1A 3F 1B
4310- 4A 6D 1A 1B 3F 2A 4D 11
4318- 00 29 6D 1A 1F 1B 4E 09
4320- 15 1B 3F 53 4D 11 1B 1B
4328- 53 4D 11 00 29 6D 1A 1F
4330- 1B 6E 0D 15 3B 3F 33 0D
4338- 0D 15 1B 1B 73 2D 2D 02
4340- 00 49 09 1A 3B 3F 4A 09
4348- 15 3B 3F 17 4D 29 1A 3F
4350- 3F 4A 49 02 00 4D 09 1A
4358- 3B 1F 2E 4D 15 3B 1B 33
4360- 6D 29 1A 3B 1F 4E 49 02
4368- 00 49 09 1A 3B 3F 6A 09
4370- 15 1B 1B 33 4D 29 1A 3B
4378- 3F 4A 49 02 00 49 29 1A
4380- 1F 3F 6A 29 15 3B 1B 33
4388- 4D 2D 1A 1F 3F 4A 49 02
4390- 00 49 09 1A 3B 3F 6A 09
4398- 15 3B 3F 37 4D 09 1A 3B
43A0- 3F 4A 49 02 00 09 6D 1A
43A8- 1F 3B 0A 4D 11 1B 3B 77
43B0- 4D 11 1B 1B 57 49 11 00
43B8- 49 09 1A 1F 3F 6A 29 15
43C0- 3B 1F 73 6D 15 3B 1B 53
43C8- 2D 0D 02 00 4D 09 1A 1B
43D0- 1B 6E 6D 1A 1F 3B 6E 09
43D8- 15 3B 1B 73 49 11 00 09
43E0- 4D 1A 1B 1B 0A 6D 11 1B
43E8- 3B 53 69 11 1B 3F 57 49
43F0- 11 00 49 29 1A 1B 1B 4A
43F8- 29 15 3B 1B 53 49 15 3B
4400- 1B 73 2D 0D 02 00 4D 09
4408- 1A 3B 1B 6E 4D 1A 1B 3B
4410- 6E 4D 1A 3B 1B 4E 49 02
4418- 00 29 4D 1A 1B 1F 4A 4D
4420- 1A 1B 1F 4A 4D 1A 3B 3F
4428- 4A 49 02 00 49 09 1A 3B
4430- 3B 6A 0D 15 3B 3B 33 0D
4438- 0D 15 3B 3B 73 49 11 00
4440- 49 09 1A 3B 1F 2E 4D 15
4448- 3B 1B 33 4D 29 1A 1F 1B
4450- 4E 49 02 00 49 09 1A 3B
4458- 3F 6A 09 15 3B 1B 33 4D
4460- 29 1A 3B 3F 4A 49 02 00
4468- 49 09 1A 3B 1F 2E 4D 15
4470- 3B 1B 37 0D 6D 1A 1B 1B
4478- 6E 49 02 00 49 09 1A 1F
4480- 3F 6A 29 15 3B 1F 73 6D
4488- 15 3B 1B 53 49 15 00 49
4490- 09 1A 3B 1F 2E 4D 15 1B
4498- 1B 33 4D 09 1A 1B 1B 4E
44A0- 49 02 00 49 09 1A 3F 3F
44A8- 6A 49 1A 3B 3F 4A 09 15
44B0- 1B 3F 77 49 11 00 69 09
44B8- 1A 1B 3F 0E 4D 11 1B 1B
44C0- 57 4D 15 1B 3F 53 49 11
44C8- 00 49 09 1A 1F 1B 6E 09
44D0- 15 3B 1B 33 4D 2D 1A 1F
44D8- 3F 4A 49 02 00 49 09 1A
44E0- 1F 1B 6E 09 15 1B 1F 57
44E8- 0D 0D 1A 1B 1F 4A 49 02
44F0- 00 49 09 1A 1F 1F 6E 0D
44F8- 15 3B 3B 33 0D 0D 15 1B
4500- 1F 57 49 11 00 49 09 1A
4508- 1F 1B 0E 0D 0D 1A 1B 1F
4510- 0A 0D 0D 1A 1F 1B 4E 49
4518- 02 00 49 09 1A 1F 1B 6E
4520- 09 15 3B 1F 73 6D 15 3B
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By Fred Huntington

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```
4528- 1B 53 2D 0D 02 00 49 09
4530- 1A 3F 3F 4E 69 1A 1B 1F
4538- 0A 4D 11 3B 3F 77 49 11
4540- 00 29 4D 1A 3B 1B 4A 69
4548- 1A 1F 1B 4A 69 1A 3B 1B
4550- 0A 6D 11 00 09 4D 1A 3B
4558- 3B 6A 09 15 1B 1B 53 49
4560- 11 1B 1B 53 49 11 00 09
4568- 4D 1A 3B 3B 6A 09 15 3B
4570- 1B 33 2D 2D 15 3B 1B 33
4578- 4D 29 02 00 2D 6D 1A 1F
4580- 3B 0A 4D 15 1B 3F 57 4D
4588- 15 3B 1B 17 2D 6D 02 00
4590- 09 6D 1A 1F 3B 6A 49 1A
4598- 1B 1B 6E 49 1A 1F 3B 4A
45A0- 6D 02 00 2D 6D 1A 1F 3B
45A8- 0A 4D 15 3B 1B 57 4D 15
45B0- 3B 1B 17 2D 6D 02 00 2D
45B8- 2D 15 3B 1B 33 4D 09 1A
45C0- 1B 3F 6E 49 1A 1F 1B 2E
45C8- 2D 2D 02 00 2D 2D 15 3B
45D0- 1B 33 4D 09 1A 1B 3F 6E
45D8- 49 1A 1B 1B 6E 49 02 00
45E0- 29 6D 1A 1F 1B 6E 49 1A
45E8- 3F 1F 6E 09 15 3B 1B 73
45F0- 2D 0D 02 00 4D 29 1A 1F
45F8- 1B 6E 09 15 3B 3F 37 4D
4600- 29 1A 1F 1B 6E 09 15 00
4608- 29 6D 1A 1B 1F 4A 4D 1A
4610- 1B 1F 4A 4D 1A 1B 1F 0A
4618- 2D 0D 02 00 09 2D 15 1B
4620- 1F 53 09 0D 1A 3B 1B 4A
4628- 69 1A 3B 1B 0E 6D 11 00
4630- 4D 29 1A 3B 1B 6E 4D 1A
4638- 1B 3B 6E 4D 1A 3B 1B 6E
4640- 09 15 00 6D 09 1A 1B 3B
4648- 0A 4D 11 1B 1B 57 4D 11
4650- 3B 1B 17 2D 2D 15 00 4D
4658- 29 1A 3F 3B 6E 0D 15 3B
4660- 1B 33 4D 29 1A 1F 1B 6E
4668- 09 15 00 4D 29 1A 1F 1B
4670- 2E 4D 15 3B 3B 33 4D 2D
4678- 1A 1F 1B 6E 09 15 00 29
4680- 6D 1A 1F 1B 6E 09 15 3B
4688- 1B 33 4D 29 1A 1F 1B 0E
4690- 2D 0D 02 00 2D 6D 1A 1F
4698- 3B 0A 4D 15 1B 3F 57 4D
46A0- 11 1B 1B 17 6D 09 02 00
46A8- 29 6D 1A 1F 1B 6E 09 15
46B0- 3B 1B 33 0D 0D 15 1B 1F
46B8- 73 6D 15 00 2D 6D 1A 1F
46C0- 3B 0A 4D 15 1B 3F 57 0D
46C8- 0D 1A 1F 3B 2A 4D 15 00
46D0- 29 6D 1A 1F 1B 6E 49 1A
46D8- 3B 3F 4A 09 15 3B 1B 73
46E0- 2D 0D 02 00 2D 2D 15 3B
46E8- 3B 73 69 11 1B 3B 53 69
46F0- 11 1B 3B 53 2D 0D 02 00
46F8- 4D 29 1A 1F 1B 6E 09 15
4700- 3B 1B 33 4D 29 1A 1F 1B
4708- 0E 2D 0D 02 00 4D 29 1A
4710- 1F 1B 6E 09 15 3B 1B 33
4718- 4D 29 1A 3B 3B 4A 4D 02
4720- 00 4D 29 1A 1F 1B 6E 09
4728- 15 3B 1B 33 0D 0D 15 3B
4730- 1F 37 4D 29 02 00 4D 29
4738- 1A 1F 1B 0E 0D 0D 1A 1B
4740- 1F 0A 0D 0D 1A 1F 1B 6E
4748- 09 15 00 4D 29 1A 1F 1B
4750- 0E 0D 0D 1A 1B 1F 4A 4D
4758- 1A 1B 1F 4A 4D 02 00 2D
4760- 2D 15 3B 1B 73 09 0D 1A
4768- 1B 1F 0A 4D 11 3B 1B 33
4770- 2D 2D 15 00 2D 2D 15 3B
4778- 3F 37 2D 2D 15 3B 3F 37
4780- 2D 2D 15 3B 3F 37 2D 2D
4788- 15 00 0C 20
```

Dynamic Applesoft Program Change

by Garry G. Kiziak
2381 Duncaster Dr.
Burlington, Ontario
Canada, L7P 3V9

The need to change a program line during execution doesn't happen very often, but sometimes it is necessary. One of the techniques developed for doing this involves poking the new line in at the appropriate time. The difficulty with this method is that the address of the beginning of the line has first to be determined, the line must be tokenized before it is POKEd in, and if a line is changed in the program, a new starting address for the line will probably have to be determined.

Of course the best way to do this is to let the computer do all the work for you. The accompanying program **CHANGE (Listing 1.)** is a machine language routine that will do the job. The program was inspired by a similar program by Dave Lingwood in the January 1981 issue of CALL APPLE.

ENTERING CHANGE

To use this program first enter the Monitor by typing **CALL-151**. Then type the beginning Hex memory address, **341**, followed by a **colon**. Finally, you can begin entering the machine code, **20 4A FF**, in pairs of Hex characters. You can save it to disk with the command **BSAVE CHANGE,A$341,L$56**. The program begins at **$341** (Hexadecimal) or **833** (Decimal). (See the Letters column for more details on how to enter machine language programs.)

WHAT IT DOES

To use it in a BASIC program you will have to include a line such as **250 CALL 833,100** in your program. The first number in this statement (i.e. **833**) is the starting address of the M/L program. The second number (in this case **100**) is the line number of the line in your BASIC program that will be changed. To see what it is changed to, let's first go through **Listing 1** and explain how it works.

After saving the internal registers **(line 11)** the routine checks for a comma **(line 13)** and gets the number of the line to be changed **(line 14)** — in this case **100**. The routine **LINGET** stores this line number in the zero page locations **$50** and **$51** from where it will be retrieved later. **Lines 21** to **27** then tokenize whatever happens to be in the **INPUT BUFFER** (locations **$200** to **$2FF**). **Line 27** does the actual tokenizing. The other lines simply set up the appropriate registers. After this the **FINDLIN** routine searches the BASIC program for the line number stored in **$50** and **$51**. If this line number is not found an appropriate error message is given **(line 30)**. If the line number is found, the **FINDLIN** routine stores its internal address in locations **$9B** and **$9C** (i.e. **LOWTR**). **Lines 32** to **39** move the contents of the **INPUT BUFFER** (from **$200** up to the first occurrence of a zero) to the appropriate spot in the BASIC program as directed by **LOWTR**. The remaining portion of that line is filled with colons (lines **41** to **47**) and then a clean return back to your BASIC program is made in lines **49** to **55**.

This shows that when this routine is called, whatever happens to be in the INPUT BUFFER is put into the line that you designate, but in **tokenized** form. To make proper use of it we must **ensure that whatever change we wish to make is first put into the input buffer. Then we simply call the routine indicating the number of the line that we wish to change.**

One very important application of this routine would be in a program that requires entering a new function into the program **while the program is running**. This routine is ideally suited for such a situation because all we have to do is ask for the function with an **INPUT** statement. It will automatically be placed in the **INPUT BUFFER**, so all we have to do is call the routine with the destination line number that we wish the function to go to.

THE DEMO

Program 1. is a short demonstration program to show how this works. Type it in, **SAVE** it, and **RUN** it. The program will list itself and then ask you **'WHAT FUNCTION ?'**. Type in any function that you wish (e.g. **Y = SIN(X)**) and **watch line 100 change to 100 Y = SIN(X) ::::::::::::::::::::::::::::::::** — or whatever you type in.

Notice that initially **line 100** is simply a lot of colons. This is to ensure that when you change the line later, you don't change it into a line that exceeds the original length of line 100 — doing so could have dire consequences.

You don't have to type in functions. Type in **WHAT'S NEW** and watch what happens. You can use this program to see how APPLESOFT will parse or tokenize any string of characters that you like.

Notice what happens when you type in a multiple line like **X = SIN(T) : Y = COS(T)**. Line 100 does get changed correctly, but the string variable **L$**, which is keeping a record of your entry, is only equal to **X = SIN(T)**. If you look carefully, you will see the message **EXTRA IGNORED** dispayed briefly on the screen. The reason for this is that the Applesoft INPUT statement will not accept certain characters like commas or colons. This would be quite undesirable if you required a record of your input later in the program.

INPUT ANYTHING

One way around this would be to write your own input routine — one that would accept almost any character. There are many such routines available — some in machine language. A particularly elegant one was given by Craig Peterson in the May 1981 issue of COMPUTE! This routine is given in **Program 2. (lines 60000 - 60020)**. Type in **Program 2.** (or make appropriate changes to Program 1.) and RUN it. Notice that it accepts multiple line statements and that they are properly stored in the variable L$ as well. **After you have properly saved Program 2, change line 100 to 100 :::::::::: (i.e. 10 colons).** Run it and type in anything that is longer than 10 characters. This should destroy your program after line 100 and should demonstrate once and for all that it is absolutely necessary that you provide some sort of protection to ensure that any line that is changed by this routine is sufficiently long to begin with (simply by filling it up with plenty of colons).

continued on page 197

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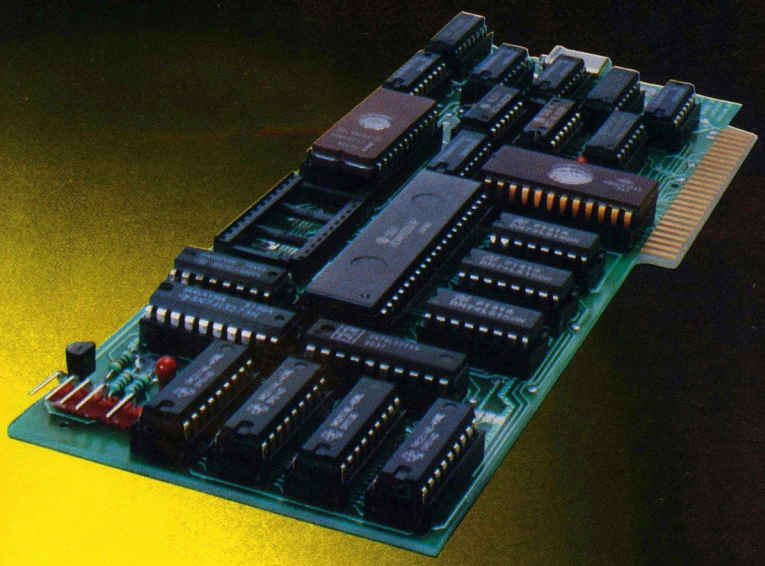

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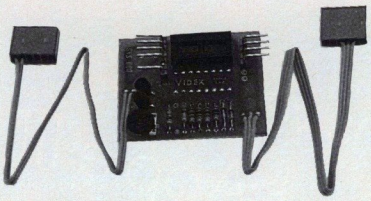

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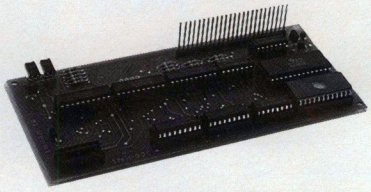

The Enhancer][features a typeahead buffer. Your keyboard has upper and lower case, and will auto repeat any key held down. A single keystroke can become a word or an entire sentence. Controlled by a powerful microprocessor, Enhancer][allows you to re-map your keyboard or add specialized features. Changing a chip creates a totally different keyboard. Enhancer][Utilities Disc included.

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Dynamic Applesoft Program Change (Cont.)

CHANGE WITHOUT INPUT

Sometimes it becomes necessary to change a line without using the INPUT statement. In this case, the new line will first have to be poked into the input buffer (without worrying about tokenizing it), then the CHANGE routine is called as before. **Program 3.** is a short demonstration program to show how this is done. The program simply **sorts a short list of names** into either ascending or descending order as per your request. It can handle both sorts with a single routine simply by changing **line 40** accordingly. Notice that the subroutine at **line 1000** pokes the new line into the input buffer (also notice that the last character poked must be a zero) before the change routine is called.

This method of changing a line provides an alternative to the REMPOKE technique given by Sandy Mossberg in NIBBLE (Vol. 2 No. 4 — REMPOKE for APSPEED). It has the advantage of not having to find the starting address of the line in which the REM token is poked each time that a change is made to the program.

This routine has many possible applications. I hope you find it as useful as I have. The Assembly Language listing was produced using Apple's DOS Toolkit Editor/Assembler.

Listing 1.

```
SOURCE FILE: CHANGE
009B:            1 LOWTR   EQU  $9B      **********************
00B8:            2 TXTPTR  EQU  $B8      *      CHANGE        *
DEBE:            3 CHKCOM  EQU  $DEBE    *  BY GARY KIZIAK    *
DA0C:            4 LINGET  EQU  $DA0C    * COPYRIGHT (C) 1982 *
FF4A:            5 IOSAVE  EQU  $FF4A    * BY MICRO-SPARC INC *
FF3F:            6 IOREST  EQU  $FF3F    * LINCOLN, MA. 01773 *
D56C:            7 PARSER  EQU  $D56C    **********************
D61A:            8 FNDLIN  EQU  $D61A
----- NEXT OBJECT FILE NAME IS CHANGE.OBJ0
0341:            9         ORG  $341
0341:           10 * SAVE REGISTERS
0341:20 4A FF   11         JSR  IOSAVE
0344:           12 * GET THE LINE NUMBER
0344:20 BE DE   13         JSR  CHKCOM
0347:20 0C DA   14         JSR  LINGET
034A:           15 * SAVE TEXT POINTER TEMPORARILY
034A:A5 B8      16         LDA  TXTPTR
034C:8D 97 03   17         STA  TEMPTXT
034F:A5 B9      18         LDA  TXTPTR+1
0351:8D 98 03   19         STA  TEMPTXT+1
0354:           20 * TOKENIZE THE INPUT BUFFER
0354:A9 00      21         LDA  #$00
0356:85 B8      22         STA  TXTPTR
0358:A9 02      23         LDA  #$2
035A:85 B9      24         STA  TXTPTR+1
035C:A2 FF      25         LDX  #$FF
035E:A0 04      26         LDY  #$4
0360:20 6C D5   27         JSR  PARSER
0363:           28 * FIND THE LINE IN THE BASIC PROGRAM
0363:20 1A D6   29         JSR  FNDLIN
0366:90 2A      30         BCC  NOPE
0368:           31 * CHANGE IT TO THE NEW LINE STORED IN THE INPUT BUFFER
0368:A0 04      32         LDY  #$04
036A:B9 FC 01   33 BEGIN   LDA  $1FC,Y
036D:F0 09      34         BEQ  DONE
036F:91 9B      35         STA  (LOWTR),Y
0371:C8         36         INY
0372:D0 F6      37         BNE  BEGIN
0374:A2 B6      38         LDX  #$B6
0376:D0 1C      39         BNE  ERR
0378:           40 * FILL UP THE LINE WITH COLONS
0378:A2 3A      41 DONE    LDX  #$3A
037A:B1 9B      42 START   LDA  (LOWTR),Y
037C:F0 06      43         BEQ  LAST
037E:8A         44         TXA
037F:91 9B      45         STA  (LOWTR),Y
0381:C8         46         INY
0382:D0 F6      47         BNE  START
0384:           48 * RESTORE TEXT POINTER
0384:AD 97 03   49 LAST    LDA  TEMPTXT
0387:85 B8      50         STA  TXTPTR
0389:AD 98 03   51         LDA  TEMPTXT+1
038C:85 B9      52         STA  TXTPTR+1
038E:           53 * RESTORE REGISTERS
038E:20 3F FF   54         JSR  IOREST
0391:60         55         RTS
0392:A2 5A      56 NOPE    LDX  #$5A
0394:4C 12 D4   57 ERR     JMP  $D412
0397:           58 TEMPTXT DS   $2

*** SUCCESSFUL ASSEMBLY: NO ERRORS
```

continued on next page

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Dynamic Applesoft Program Change (Cont.)

Program 1.

```
]PR#0
]POKE1913,72

]LIST

0  HOME
10  PRINT  CHR$ (4)"BLOAD CHANGE"
20 CHANGE = 833
30  POKE 34,0: VTAB 1
40  LIST  - 100
42  VTAB 20: PRINT "L$ = ";L$
45  VTAB 22: POKE 34,21: HOME
50  INPUT "WHAT FUNCTION ? ";L$
60  CALL CHANGE,100
70  POKE 34,14: POKE 35,21: HOME : POKE 35,24: GOTO 30
100 ::::::
```

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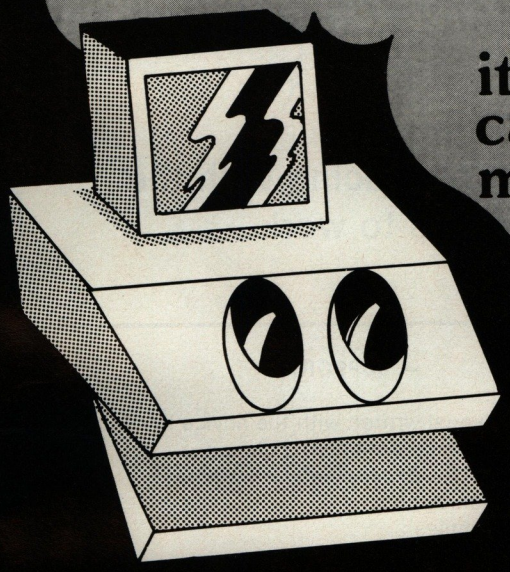

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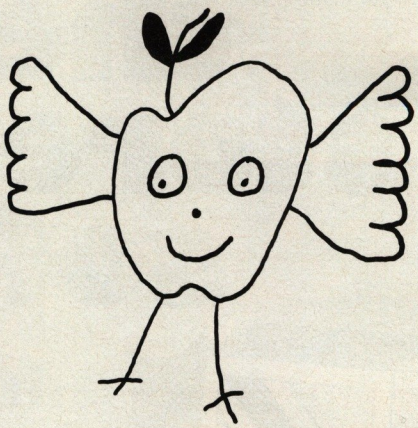

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by Thorne D. Harris III
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DAVID AND GOLIATH

Judging from the great response we have received, there are many entrepreneurs out there just itching to enter the business world. In most instances, you may have a program, or just an idea, which you feel is marketable, so you decide to start your own company. The microcomputer software industry is truly the field for "cottage" or "mom and pop" businesses. Indeed, a recent **Venture** magazine article noted that there were **over 5500 different software developers in the United States**, with many of these literally being "run out of the attic". Although many of these enterprises will grow to employ a number of individuals, and perhaps some will even become multimillion dollar Goliaths like Apple Computer Inc., frequently the initial company consists of the programmer (or idea person) and, maybe, a spouse. It is for this audience (the fledgling businessman who is probably operating on a shoestring, usually has another full-time job, and feels he can't afford professional advice) that this particular column is written. Apple Computer Inc. has its own attorneys.

First, as I have emphasized in past columns and as Mike Harvey has urged in his editorials, if you are serious about starting a business, you should **definitely seek the help of an attorney and accountant**. However, there are a number of things you can do on your own and many concepts and problems with which you should be familiar, if at all possible, even before your meet with the pros. If you have an understanding of these before you consult with your accountant and lawyer, you will be in a much better position to make intelligent decisions. In this column we will try to cover a few of these sometimes confusing issues, including some of the rather perplexing forms you will receive from the people in Washington. Along the way, there will be a brief legal lesson on the different treatment of profit and salary.

As regular readers of this column know, we have previously discussed some of the fundamental problems and considerations involved in starting your own company. The basic forms of enterprise were treated several issues ago and some of the terms and pitfalls you may encounter in incorporating were the subject of the last column. As has been noted before, once you become a businessman — as opposed to a hobbyist — **record-keeping and "form-filing" becomes necessary evils**. In this issue I will touch upon a few of the forms you will intially encounter, in the hope of straightening out some of the confusion usually generated by these documents. Although it seems that the authors of most government forms and instructions must be illiterate, if you take your time and read the small print you will muddle through just fine.

WHAT'S YOUR NUMBER?

Thanks primarily to (dare we say it?) computers, it seems that before you can do anything today you must have a number. Although this is generally true throughout the corporate world, Uncle Sam is the worst offender. Consequently, one of the first things you will need when you establish your enterprise is an **Employer Identification Number**. (The **EIN** is not limited to corporations; all employers should have one.) This number helps the Federal Government make sure it collects appropriate income tax and FICA from you for all of your employees. It also means the Feds will expect a tax return of some kind for your number. The form you need in order to obtain this wondrous number is **Form SS-4**, cleverly titled **"Application for Employer Identification Number"**, and it is available from your friendly, neighborhood IRS office.

While you may initially state **"applied for"** when asked for your EIN on some applications, **the EIN will be required on virtually everything you file from here on out**. Therefore, it is a good idea to apply for it as soon as possible. Besides, most banks require your EIN when you open a company account, and even the smallest operation should have a separate bank account to isolate business transactions from personal activities. The form is short and fairly straightforward, requiring basic information about your business such as date started, location, and the nature of the business.

I have encountered many people who become flustered when asked to describe the nature of the business because they feel that there is some magic legal phrase they must use. This is not the case however, and something as simple as "computer software & related items" will generally satisfy the red tape people. If you do not answer correctly (i.e., with something a bureaucrat can understand) or you neglect to fill in a necessary blank, they will send the form back to you for a second attempt.

PAPER REDUCTION ACT

Once you have a number, you will be on the mailing list and "Big Brother" will probably deluge you with far more forms and information than you want. Fear not! They also send you a little piece of paper, pursuant to the Paperwork Reduction Act, along with almost every document which, I assume, is supposed to give you some comfort. This notice is one of the gems of modern bureaucracy. Originally designed to help unravel the masses of red tape and paperwork, it dutifully explains that the IRS must tell you what the information they request is to be used for, how it will be used, why they are requesting it, and whether you are required to give the information. While this sounds like it might be helpful, a typical government response is: "We ask for the data to carry out the Internal Revenue Laws of the United States. We need it to ensure that you are complying with these laws and to allow us to figure and collect the right amount of tax. You are required to give us this information." Real helpful!

continued on next page

The Good News There's lots of great new enhancements to BASIC like RENUMBER, PRINT USING and SORT, as well as lots of other useful assembly language routines, many using the ampersand.

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HERE'S 1 FOR YOU, 19 FOR ME (TAXMAN, *by Lennon & McCartney*)

Now that you are the employer, rather than the employee, one of the first forms you will receive from your Uncle is a set of computer cards for reporting the **FICA** and **Federal income tax** that you are required to withhold from your employees. You will also receive the appropriate quarterly tax forms to file, as well as **Circular E**, **"Employer's Tax Guide"**, which is supposed to explain everything. Unfortunately, this pamphlet is 50 pages long (although most of the length is due to tax tables) and there is an additional 36 page supplement. These documents are as lucid and clear as most government forms — which means they are virtually unintelligible. They do, however, contain lists of other (hopefully) helpful forms, and there is a form for just about everything.

If you are running an operation large enough to actually have few paid employees, then you should certainly consult your attorney and accountant about appropriate systems to keep track of all of this and to **make sure you don't miss any deadlines**. You will be required to file **W-2's** and **W-4's** and there is a whole series of forms numbered in the 940's which might be applicable. **Form 941**, the **"Employer's Quarterly Federal Tax Return"** is the one most commonly used. Because each business has its own unique problems, I will not attempt a walk-through of each of these forms. As I said, if you are large enough to worry about all of this, I highly recommend professional assistance. There are also a number of accounting and payroll software packages available now. However, the utility of particular programs is usually a function of how your business operates and is a little different for each company. Therefore, choose carefully after you have an understanding of how your business will operate.

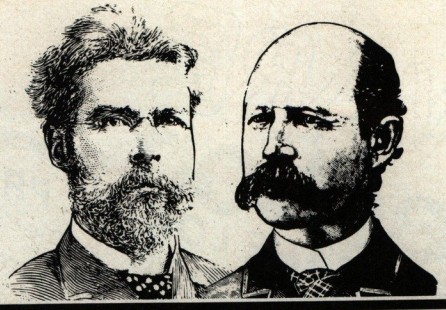
More important for the very small ("micro"?) businessman is any actual reduction in work and aggravation. Although it is sometimes hard to discern from the instructions, if you do not have any employees, you are generally not required to file these withholding forms. As long as there are no salaried employees, no withholding is necessary, even though you may be making a profit, and spending it. An explanation is in order regarding the distinction between shareholders, owners and employees.

OWNERS, EMPLOYEES, AND SHAREHOLDERS

The owners of an incorporated company (which would be the shareholders), may also be employees. For example, you and your spouse may own 50% each of the stock of Me & My Apple, Inc. Your spouse may also be the President and you may be the Secretary, and the company may pay you a salary. This is different than having the company paying you a dividend as a shareholder. The **salary** is subject to all of the withholding provisions of the law, while a stock dividend is usually a different animal.

Ordinary **dividends** paid during the year are reported as dividends on Form 1040, your standard personal income tax form you file each year. If you opt for **Subchapter S** status (explained in a previous column), the com-

continued on next page



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pany profits will be treated as constructive dividends (even if you left the money in the company) and generally reported on **Schedule E** of **Form 1040** as your personal income.

The situation becomes even more complex if you receive a salary (subject to withholding and treated as your income), but your Subchapter S corporation or other business posts a loss (which reduces your income). Note that in this instance, part of your remuneration is withheld, even though at the end of the year you may get it back, less FICA (which is seldom returned), by virtue of the overall loss.

You may also have others working for you, such as outside programmers. If you pay them a salary, then the salary is subject to withholding. (They will also become your employees and may subject you to additional liability for their actions!) On the other hand, you may contract with them as "independent contractors" and thereby avoid having them classified as employees. In any event, you need to understand the relationship in order to properly account for it. **This is not just an academic exercise, since the penalties for not reporting can range from interest on the underpayment to a jail term and thousands of dollars in fines for defrauding the government.**

MORE PAPER

Since many start-up software companies involve a lot of moonlighting and evening work, and frequently are in addition to a "regular" job, many start-up companies will not have any paid employees. As noted, this greatly simplifies your reporting requirements (the fine print does say that only companies withholding taxes must file, and if you have no paid employees you do not have to withhold any tax). Nonetheless, you should be aware of the paper deluge awaiting you and prepare to decipher these forms. After all, if you are successful, you will have someone working for you one day and then all of this will make a little more sense. In the meantime take solace in the relative simplicity of your small operation; as you grow, so will the paperwork!

Of course, we have barely scratched the surface of the mound of paperwork awaiting the small businessman. There will be **insurance** to consider; other benefits such as **retirement** and **stock options**; **contracts**; naturally there are extra forms you must fill out if one of your employees files for **unemployment** (the employer pays a share of this); and many, many more items. There are also **state and local requirements** which must be met. Since these vary from State to State it is hard to be specific, but they can be anything and everything from an occupational license tax to sales and income taxes. Some State and local governments also require withholding. And don't forget about quarterly tax reports and the like. As with the Feds, if you don't have any employees, you probably will not have too much trouble until the end of the year. However, you should try to watch all of these regulations as well and keep meticulous records. When in doubt, ask that attorney or accountant you have retained.

ANOTHER WAY

Some entrepreneurs thrive on such headaches. Others, however, would rather be programming the latest Apple space adventure. For these independents there is also hope. Often, the simplest way to proceed, particularly for the moonlighter, is by **selling or licensing your program to an established software producer**. This usually means giving up control of the product in exchange for someone else taking on the publishing, marketing, etc. However, the rights and obligations in these matters are controlled almost completely by contract and can vary greatly from company to company. In future columns I will cover some of the more important points involved in these arrangements.

In the meantime, don't forget that this column is here to answer, as much as is possible, the questions you want answered. If you have a particular subject you would like to see covered, please drop me a note and I will try to get to it as soon as possible.

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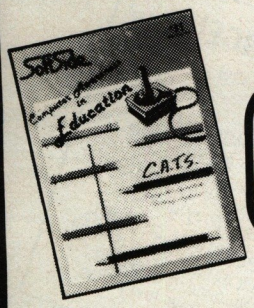

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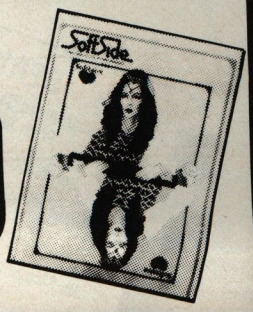

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Pascal I/O Aids

by Robert V. Anderson
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Anyone who has had the experience of passing from interactive BASIC to Pascal has probably been frustrated by the unforgiving nature of the Pascal input-output routines. For example, when entering a real value in the interactive mode, it is impossible to backspace using the left arrow to correct mistakes. In addition, one does not get a second chance if the machine is expecting an integer and you enter a string that contains characters other than digits.

Rather than writing error trapping routines for each program, I decided to write the **Pascal unit IOAIDS** as a final solution to this problem.

After the compilation of this unit (**Listing 1**) it must be placed in a library which may be either the **SYSTEM.LIBRARY** or **one defined by the user**. I prefer the second alternative since any program using the unit may be used by anyone without requiring the user to modify the SYSTEM.LIBRARY. After compiling the unit IOAIDS you should consult chapter 5 of the Apple Pascal Language Reference Manual to see how to integrate it into a library. Once this has been done, programs may **USE** the unit **IOAIDS**.

The simple program in **Listing 2** illustrates the use of IOAIDS and may be used to verify that it is functioning correctly. It is supposed that IOAIDS has been placed in a user library called **IO.LIBRARY** which resides on the diskette APPLE2 with the compiler.

HOW IT WORKS

When one of the procedures of IOAIDS is called, it waits for the user to input a string. Once entered this string is checked for length and syntax by the boolean function **INTERROR** if it is supposed to be an integer or by the boolean function **REALERROR** in the case of real input. The error checking for integers is rather straightforward and can be understood from a direct reading of the procedure INTERROR. For the real case the procedure REALERROR performs the following analysis:

1. Read the string to be converted. If any of the following conditions holds then exit with REALERROR true:

   a) The string is of length 0.

   b) The last character of the string is not a digit.

   c) The string contains characters not in the set ['+','-','.','E','0'..'9'].

2. Check the first character for the sign. Default to + if a digit is found. Strip off the sign character, if present.

3. Find the position of the exponential part. Note that **POS** returns **0** if the character is not found.

4. Separate **S** into two substrings **S** and **T** representing the mantissa and the exponential parts of the number. **(T=" if there is no exponential part.)**

continued on page 217

```
(*$S+*)
(*    IOAIDS BY ROBERT ANDERSON    *)
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UNIT IOAIDS;
INTERFACE

              { Unit conceived to help in avoiding errors due to }
              { the input of integers, long integers and reals.  }

TYPE LONGINT=INTEGER[12];

PROCEDURE ININT(VAR X:INTEGER);   { Returns an integer (-37767 to 37767) }
PROCEDURE INLONG(VAR X:LONGINT);  { Returns a long integer[12]           }
PROCEDURE INREAL(VAR X:REAL);     { Returns a real (standard format)     }

IMPLEMENTATION

TYPE STRTYPE=STRING[40];

VAR DIGITS : SET OF '0'..'9';

FUNCTION INTERROR(VAR S:STRTYPE;LEN:INTEGER;VAR L,SIGN:INTEGER):BOOLEAN;

              { Used by the procedures ININT and INLONG to parse  }
              { the input string for incorrect characters. It is  }
              { called with LEN=6 for ININT or 13 for INLONG.     }

VAR I    : INTEGER;
    FLAG : BOOLEAN;
BEGIN
  FLAG:=TRUE;
  IF (L=0) OR (L>LEN) OR ((L=LEN) AND ([S[1]]*['+','-']=[])) THEN FLAG:=FALSE
  ELSE
  BEGIN
    IF S[1]='-' THEN SIGN:=-1 ELSE SIGN:=1;
    IF (S[1] IN ['+','-']) AND (L>1) THEN
    BEGIN
      S:=COPY(S,2,L-1); L:=L-1
    END;
    FOR I:=1 TO L DO
      IF NOT (S[I] IN DIGITS) THEN FLAG:=FALSE;
    IF (LEN=6) AND (L=5) AND (S>'32767') THEN FLAG:=FALSE
  END;
  INTERROR:=FLAG
END;

PROCEDURE ININT;
VAR SIGN,I,L,Z : INTEGER;
    FLAG       : BOOLEAN;
    S          : STRTYPE;
BEGIN
  REPEAT
    READLN(S); L:=LENGTH(S);
    FLAG:=INTERROR(S,6,L,SIGN);
    IF FLAG THEN
    BEGIN
      Z:=0;
      FOR I:=1 TO L DO
        Z:=10 * Z + ORD(S[I]) - 48;
      X:=Z * SIGN
    END ELSE
    BEGIN
      FOR I:=1 TO 25 DO WRITE(CHR(28));
      WRITE(CHR(31),CHR(7),'? ')
    END
  UNTIL FLAG
END; { ININT }

PROCEDURE INLONG;
VAR SIGN,I,L : INTEGER;
    FLAG     : BOOLEAN;
    S        : STRTYPE;
BEGIN
  REPEAT
    READLN(S); L:=LENGTH(S);
    FLAG:=INTERROR(S,13,L,SIGN);
    IF FLAG THEN
    BEGIN
      X:=0;
      FOR I:=1 TO L DO X:=10 * X + ORD(S[I]) - 48;
      X:=SIGN * X
    END ELSE
    BEGIN
      FOR I:=1 TO 25 DO WRITE(CHR(28));
      WRITE(CHR(31),CHR(7),'? ')
    END
  UNTIL FLAG
END; { INLONG }
```

continued on page 217

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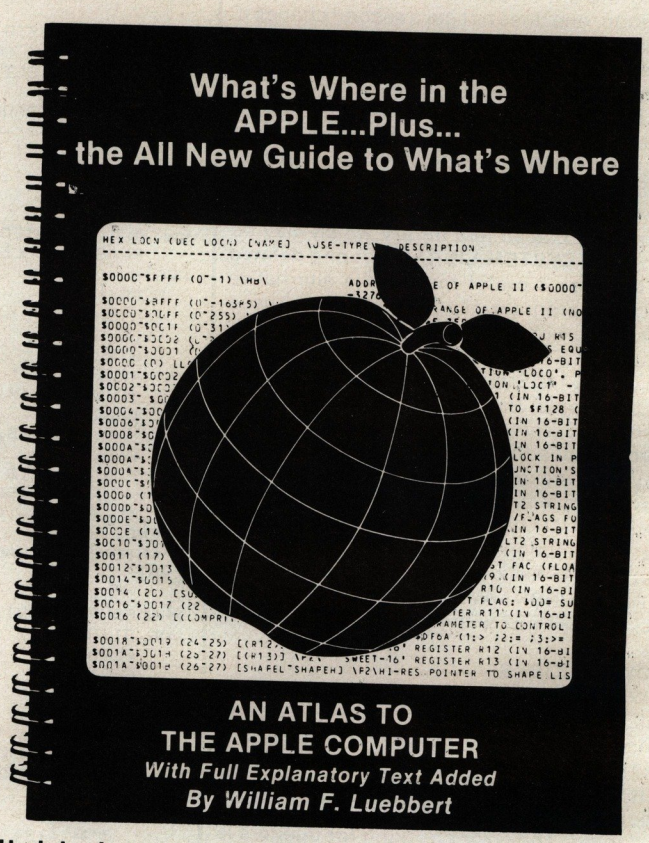

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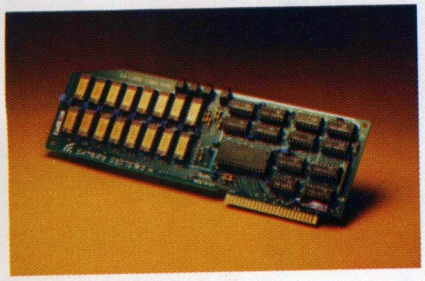

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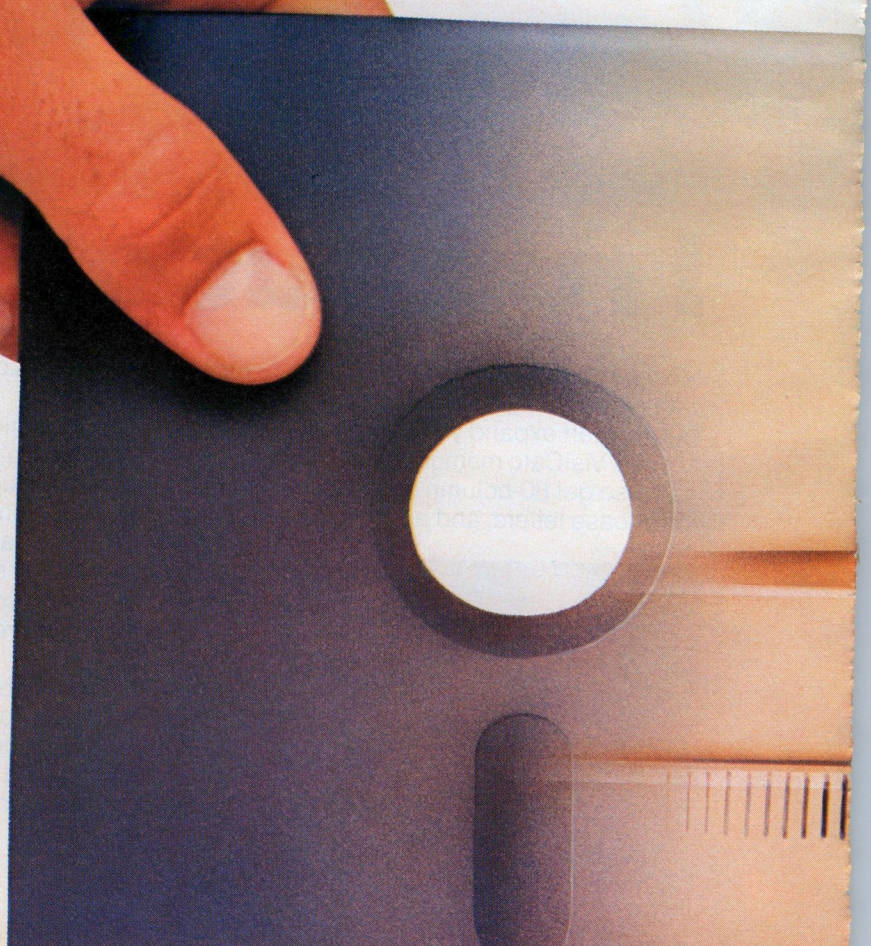

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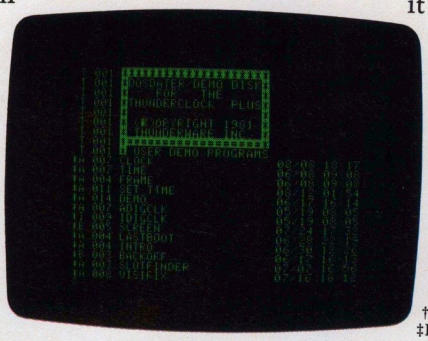

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Pascal I/O Aids (Cont.)

5. Analyze **T** if it is not null. First the sign is recorded and the sign character is eliminated, if present. The remaining characters are then verified and if they are digits they are then converted into an integer format. If **T** fails any of the tests then we exit from REALERROR, returning the value True.
6. Find the decimal point in **S** and separate **S** into two parts **S** and **T** (i.e. before and after the point). The second string is null if there is no decimal point. Check to insure that the position of the decimal point will not cause overflow when the number is normalized.
7. If all of the above tests have succeeded, then set REALERROR to False and return to the procedure INREAL.

If REALERROR=False after the call, then the values of the variable parameters of the function are used to calculate the real number. In case of underflow the returned value is zero.

When an error is detected by any of the procedures, the bell is sounded and the cursor returns to a right justified position on the offending line. Then a question mark is printed and the procedure waits for the user to reenter the number.

POSSIBLE USER MODIFICATIONS

The procedure **INLONG** has been set up for long integers (with at most 12 digits), and this seems sufficient for most applications. However, if you want to change it, be sure to change the data type **LONGINT** and recalculate the position on the screen where the cursor is to be placed after encountering an error.

In general, spaces are not accepted in numbers (not even leading or trailing ones). You may want to modify this. If so, the leading and trailing spaces should be removed immediately after the string has been entered.

In general, cursor positioning after an error is a problem. The solution adopted in this unit is a compromise, in that the cursor returns to the offending line but not to the exact position where the original number was entered. This may be corrected in **two ways**. The **first** would be to add a parameter to each procedure indicating the horizontal position on the line where input is to start. Then when an error is detected we simply move the cursor up one line by writing CHR(31) and then over to the position by writing CHR(28) the required number of times. In fact the procedures of the unit actually do this for a fixed horizontal tab of 25 columns so just replace the 25 by the parameter. The **second** solution would require peeking memory to find the current cursor position before accepting input. The disadvantage of such a solution is that the unit would then be version dependent since Apple reserves the right to move these locations in future releases.

```
PROCEDURE INREAL;
VAR  EX,SIGN,I : INTEGER;
     Y,Z,D     : REAL;
     S,T       : STRTYPE;
     FLAG      : BOOLEAN;

     FUNCTION REALERROR(VAR EX,SIGN:INTEGER;VAR S,T:STRTYPE):BOOLEAN;
     CONST COMP='274860000';
     VAR I,J,L,M,SIGN2 : INTEGER;
         FLAG          : BOOLEAN;
     BEGIN
       FLAG:=TRUE; L:=LENGTH(S); REALERROR:=TRUE;
       IF L=0 THEN FLAG:=FALSE ELSE
       IF NOT (S[L] IN DIGITS) OR (L>13) THEN FLAG:=FALSE;
       FOR I:=1 TO L DO
         IF NOT (S[I] IN ['+','-','.','E','0'..'9']) THEN FLAG:=FALSE;
       IF NOT FLAG THEN EXIT(REALERROR);
       IF S[1] IN ['+','-'] THEN
       BEGIN
         IF S[1]='-' THEN SIGN:=-1 ELSE SIGN:=1;
         S:=COPY(S,2,L-1); L:=L-1
       END ELSE SIGN:=1;;
       I:=POS('E',S); EX:=0;
       IF I>0 THEN
       BEGIN
         T:=COPY(S,I+1,L-I); S:=COPY(S,1,I-1);
         L:=I-1; M:=LENGTH(T);
         IF T[1]='-' THEN SIGN2:=-1 ELSE SIGN2:=1;
         IF (M=1) AND NOT (T[1] IN ['0'..'9']) THEN FLAG:=FALSE ELSE
         IF T[1] IN ['+','-'] THEN T:=COPY(T,2,M-1);
         FOR J:=1 TO LENGTH(T) DO
           IF NOT (T[J] IN DIGITS) THEN FLAG:=FALSE;
           IF LENGTH(T)>2 THEN FLAG:=FALSE ELSE
           IF LENGTH(T)=1 THEN T:=CONCAT('0',T);
           EX:=SIGN2*(10*ORD(T[1])+ORD(T[2])-528)
         END;
         IF NOT FLAG THEN EXIT(REALERROR);
         I:=POS('.',S);
         IF I>0 THEN
        BEGIN
          IF I=LENGTH(S) THEN T:='' ELSE
          BEGIN
            T:=COPY(S,I+1,LENGTH(S)-I);
            S:=COPY(S,1,I-1)
          END
        END ELSE T:='';
        FOR I:=1 TO LENGTH(S) DO
          IF NOT (S[I] IN DIGITS) THEN FLAG:=FALSE;
        FOR I:=1 TO LENGTH(T) DO
          IF NOT (T[I] IN DIGITS) THEN FLAG:=FALSE;
        IF NOT FLAG THEN EXIT(REALERROR);
        REPEAT { Strip S of leading zeroes }
          I:=POS('0',S);
          IF (I=1) AND (LENGTH(S)>1) THEN S:=COPY(S,2,LENGTH(S)-1)
        UNTIL (I<>1) OR (LENGTH(S)=1);
        IF LENGTH(T)>1 THEN { Strip T of trailing zeroes }
        WHILE (T[LENGTH(T)]='0') AND (LENGTH(T)>1) DO
          T:=COPY(T,1,LENGTH(T)-1);
        IF (EX+LENGTH(S)<39) OR ((EX+LENGTH(S)=39) AND
           (COPY(COMP,1,LENGTH(S))>=S)) THEN REALERROR:=FALSE
      END; { REALERROR }

 BEGIN { INREAL }
   REPEAT
     READLN(S);
     FLAG:=REALERROR(EX,SIGN,S,T);
     IF FLAG THEN
     BEGIN
       FOR I:=1 TO 25 DO WRITE(CHR(28));
       WRITE(CHR(31),CHR(7),'? ')
     END
   UNTIL NOT FLAG;
   Z:=0;
   FOR I:=1 TO LENGTH(S) DO Z:=10 * Z + ORD(S[I]) - 48;
   IF Z=0 THEN { Check for underflow }
   BEGIN
     IF LENGTH(T)>0 THEN
     BEGIN
       FLAG:=FALSE; I:=1;
       WHILE NOT FLAG DO
       BEGIN
         IF T[I]='0' THEN I:=I+1 ELSE FLAG:=TRUE;
         IF I>=LENGTH(T) THEN FLAG:=TRUE
```

continued on page 220

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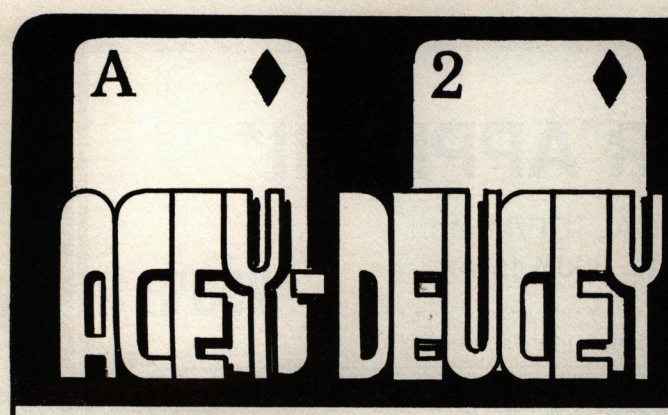

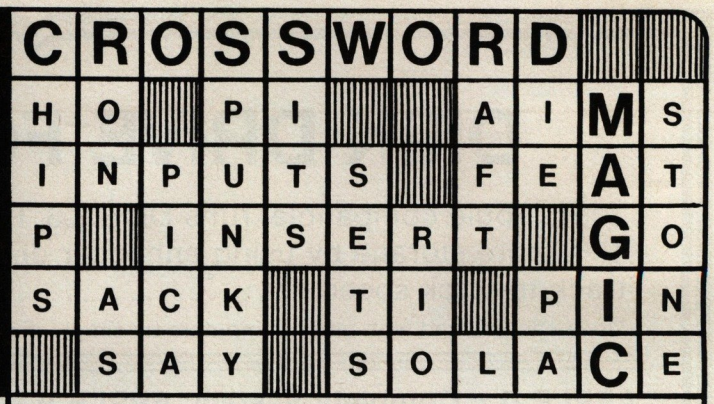

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Pascal I/O Aids (Cont.)

```
Y:=0; D:=10;
FOR I:=1 TO LENGTH(T) DO
BEGIN
  Y:=Y + (ORD(T[I])-48) / D; D:=D * 10
END;
Z:=Z+Y;

   IF EX>=0 THEN X:=SIGN * Z *

      PWROFTEN(EX) ELSE

        X:=SIGN * Z / PWROFTEN(-EX)
   END; { INREAL }

   BEGIN
     DIGITS:=['0'..'9']
   END.

       END
     END;
     IF EX-I<-37 THEN
     BEGIN
       X:=0; EXIT(INREAL)
     END
   END ELSE IF EX+LENGTH(S)<-36 THEN
     BEGIN
       X:=0; EXIT(INREAL)
     END;
```


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Pascal List Linker

by James R. Florini, Ph.D.
Syracuse University
209 Lyman Hall
108 College Place
Syracuse, NY 13210

The article by Larry Litwin in Vol. 2/No. 3 of NIBBLE was an excellent introduction to the Pascal text editor, and it should certainly have encouraged many readers to look into the uses of this excellent feature of the Apple Language System. The accompanying program makes this text editor even more attractive because it allows printing of long, multipage files as well as stringing together as many files as might be wished. It would be possible to print out an entire Ph.D. dissertation this way (my wife is planning to do so), and I have already used this system to prepare several scientific papers and grant applications.

The PRINTFILES program allows the user to **specify up to 20 files to be printed in the specified sequence**, either continuing on the same page or starting a new page with any page number desired. The top and bottom margins can be anything the user desires, and the text can be single-, double-, or whatever-spaced, depending on the needs of the user. If more than 20 files are needed, it is easy to change the value of MAXFILES; I chose 20 because it allows the summary of files to be printed to appear on the screen all together in the SHOW_LIST procedure. In fact, I can't recall printing more than 10 files at once, but others may have greater needs.

IN OPERATION

The program starts by giving a general introduction and then asking the user whether the system has three disk drives (I use one system with two drives and one with three). It then accepts entries of the names of files to be printed, adds ".TEXT" if necessary, and then **searches all available drives** for the file in question. If it is found, the drive number is recorded with the name so the printout will proceed smoothly. If the file is not found, the user is asked to supply a correct name (or insert the diskette that has the file). All of this may seem a bit excessive, but an earlier version of this program simply skipped over files that were not found, and this led to some distressing omissions if I made a mistake while entering a file name. With the present version, the program doesn't continue until all the specified files are found. Obviously, this part could be adapted to one, four, or any number of drives that you might have in your system.

The program also allows the user to **specify that a file will start a new page** (by typing "**page**" for the filename); this is handy when you are printing a series of unrelated files, letters, etc. If "**page**" is entered, the user is prompted to give the number of the first page in the new file. When I first wrote this program, it read the page number directly as an integer variable, and it bombed countless times as I forgot that I had to **enter a number**, **NOT the next file name**. This is what prompted me to write the **VALUE function** to avoid such fatal I/O errors.

continued on page 225

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```
PROGRAM  PRINTFILES;
     {THIS PROGRAM ALLOWS SEQUENTIAL PRINTING OF TEXT FILES IN
ANY ORDER OR NUMBER SPECIFIED BY THE USER}
CONST MAXFILES = 20;
    PAGELENGTH = 66; {ASSUMING 66 LINES/11 INCH PAGE}
TYPE FILES = ARRAY [1..MAXFILES] OF STRING;
VAR
    FILENAME: FILES;
    CHOICE, CH: CHAR;
    LINES,SPACING, SKIPOVER, PAGE, N, J:INTEGER;
    MARGIN: REAL;
    SOURCEFILE, PRINTOUT: TEXT;
    THREEDRIVES, PAUSE, NUMBER: BOOLEAN;
    TEXTLINE, RESPONSE: STRING;
    PAGENUM: ARRAY [1..MAXFILES] OF INTEGER;


FUNCTION VALUE (STRINGENTRY: STRING): REAL;
VAR ONEDIGIT: STRING;
    NUMBER, TOTALDIGITS, DECIMAL, I, J, TIMESTEN: INTEGER;
    PARTIAL, MULTIPLIER: REAL;
    NEGATIVE: BOOLEAN;
    PARTVALUE: ARRAY [1..12] OF REAL;


BEGIN
  NEGATIVE := STRINGENTRY[1] = '-';
  DECIMAL := POS ('.', STRINGENTRY);      {RETURNS "0" FOR AN INTEGER}
  TOTALDIGITS := LENGTH (STRINGENTRY);
  IF DECIMAL = 0 THEN DECIMAL := (TOTALDIGITS+1)
  ELSE BEGIN
         DELETE (STRINGENTRY, DECIMAL,1);
         TOTALDIGITS := TOTALDIGITS - 1
       END;
  FOR I:= 1 TO TOTALDIGITS DO      {READ EACH DIGIT IN THE STRING}
  BEGIN
    ONEDIGIT:= COPY (STRINGENTRY,I,1);
    NUMBER := POS (ONEDIGIT, '123456789');
    TIMESTEN := DECIMAL - I - 1; MULTIPLIER := 1;
      IF TIMESTEN > 0 THEN FOR J:= 1 TO TIMESTEN DO MULTIPLIER:= MULTIPLIER*10;
      IF TIMESTEN = 0 THEN MULTIPLIER := 1;
      IF TIMESTEN < 0 THEN
         FOR J:=-1 DOWNTO TIMESTEN DO MULTIPLIER:=MULTIPLIER*0.1;
    PARTVALUE [I] := NUMBER*MULTIPLIER
  END;        {FOR I:= 1 TO TOTALDIGITS}
  PARTIAL:=0;
  FOR I:=1 TO TOTALDIGITS DO PARTIAL:=PARTIAL + PARTVALUE[I];
  IF NEGATIVE THEN PARTIAL := PARTIAL * (-1);
  VALUE := PARTIAL
END;        {VALUE FUNCTION}


PROCEDURE CLEAR_SCREEN;
BEGIN
  WRITE (CHR(25), CHR(27), CHR(59));
  WRITELN ('              MEMORY AVAILABLE IS ',MEMAVAIL, ' WORDS.');
  WRITELN; WRITELN; WRITELN
END;

PROCEDURE GENERAL_INSTRUCTIONS;
  BEGIN


     CLEAR_SCREEN;
     WRITELN ('This program allows the user to print Pascal text files from');
     WRITELN ('either drive in any desired order.  The boot disk must be');
     WRITELN ('present to START the program, but it can be replaced NOW');
     WRITELN ('with a diskette containing text. ');WRITELN;
     WRITELN ('   To start a new page (at any specified page number) for a ');
     WRITELN ('new file, just enter "page" as the filename preceeding it.');
     WRITELN
  END;  {GENERAL_INSTRUCTIONS}

PROCEDURE GET_FILES;
(*$I-*)
VAR CHOICE: CHAR;
    I, RESULT: INTEGER;
    ENTRY: STRING;

  PROCEDURE ADD_TEXT;
  VAR L: INTEGER;
  BEGIN
    L := LENGTH (ENTRY);
```

continued on page 225

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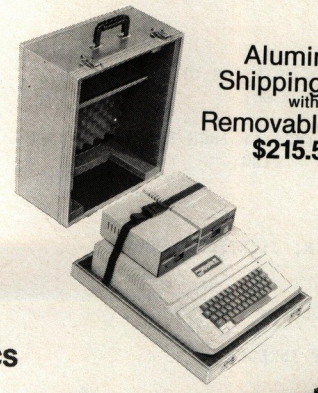

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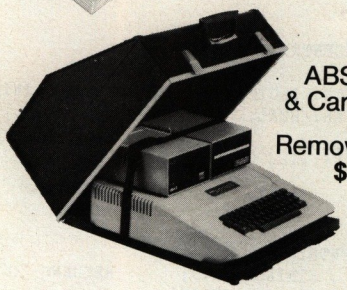

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Pascal List Linker (Cont.)

FORMATS

When all files have been entered, a choice of formats is offered in **STANDARD FORM**. If none of them fit the particular task, each parameter can be specified individually in **SET FORMAT**. Finally, when all this is done (it really doesn't take long), the program begins to print out the files specified. It is a rather chatty operation, and it keeps the user informed by printing a running log of its activities on the console screen while it is printing the files on the printer. The heart of the program is the little **READ_FILE** procedure, which transfers the text, line by line, to the printer. The **LINE_FEED** procedure keeps track of line numbers, and it invokes **BOTTOM_PAGE** (which in turn calls **TOP_PAGE**) when a page is completed. The program accomodates the use of fanfold, roll, or single-sheet paper, depending upon whether the PAUSE option is selected. When all the files are printed, the console prints a triumphant proclamation of that fact.

ENHANCEMENTS

Of course, it is possible to print the files character-by-character rather than line-by-line, and this offers wide possibilities for formatting the output and thus making the Apple Pascal system a true text editor. It is difficult to specify this in detail because printer features and control characteristics differ so widely, but the general ideas can be described. Assuming that you have decided to use "@" as the signal that a non-printing signal character will follow, then modify **READ_FILE** as follows:

```
PROCEDURE READ_FILE;
VAR CH: CHAR;
BEGIN
 WHILE NOT EOF(SOURCEFILE) DO
 BEGIN
  WHILE NOT EOLN(SOURCEFILE) DO
  BEGIN
   READ (SOURCEFILE, CH);
   IF CH = '@' THEN READ_SIGNAL
    ELSE WRITE (PRINTOUT, CH)
  END;
  READLN (SOURCEFILE);
  WRITELN (PRINTOUT)
 END;
END;
```

This should be preceded by a **READ_SIGNAL** procedure which reads the next character and calls whatever it specifies. For example, you might use **"U"** for superscript, **"D"** for subscript, and **"_"** to underline, if your printer has half-up, half-down, and backspace (or direct underline) capabilities. I have one subroutine that prints the plus-or-minus which appears frequently in tables of scientific results. All of these can be called by arranging a **CASE** statement in **READ_SIGNAL** to invoke the desired feature. You can even print "@" itself, by simply having it be one element in the CASE series, as follows:

```
PROCEDURE READ_SIGNAL;
BEGIN
  READ (SOURCEFILE, CH);
  CASE CH OF
  'U' : SUPER_SCRIPT;
      {A PROCEDURE THAT TRANSMITS
       THE HALF-DOWN COMMAND}
```

continued on page 229

```
    IF (COPY(ENTRY, L-4, 5) <> '.TEXT') AND (COPY(ENTRY, L-4, 5) <> '.text')
        THEN ENTRY:= CONCAT(ENTRY,'.text');
  END;

  PROCEDURE GET_PAGENUM;
    VAR RESPONSE, ENTRY: STRING;
        NUMERALS: SET OF CHAR;
    BEGIN
      N := N - 1;  {TO GET RID OF "PAGE" SIGNAL AS A FILE NAME}
      NUMERALS := ['0'..'9'];
      WRITE ('What will be the number of the first page in the next file?  ');
      READLN (ENTRY);
      IF NOT (ENTRY[1] IN NUMERALS) THEN
      REPEAT
        WRITE (CHR(7)); WRITELN ('The entry ',entry,' is incorrect; please');
        WRITE ('enter a corrected number for the first page. ');
        READLN (ENTRY);
        IF VALUE (ENTRY) <> 0 THEN PAGENUM[N] := ROUND (VALUE(ENTRY)) ELSE
          PAGENUM [N] := 0;
      UNTIL (ENTRY[1] IN NUMERALS);
      IF VALUE(ENTRY) <> 0 THEN PAGENUM [N+1] := ROUND (VALUE(ENTRY)) ELSE
         PAGENUM [N+1] := 0;
    END;  {GET PAGENUM}

PROCEDURE CHECK_FILES;
VAR COLON: INTEGER;
    TESTFILE: TEXT;
    VOLNUM, SEEKFILE: STRING;

  PROCEDURE TRY_IT;
  BEGIN
    (*$I-*)
    SEEKFILE:= CONCAT (VOLNUM, ENTRY);
    writeln ('Searching for ',seekfile);
    RESET (TESTFILE, SEEKFILE);
    RESULT := IORESULT
  END;

  BEGIN  {MAIN CHECK_FILES}
    (*$I-*)
    CLOSE (TESTFILE, LOCK);
    COLON := POS (':', ENTRY);
    IF COLON <> 0 THEN TRY_IT;
    IF RESULT <> 0 THEN DELETE (ENTRY, 1, COLON);
    VOLNUM := '#5:'; TRY_IT;
    IF RESULT <> 0 THEN BEGIN VOLNUM := '#4:'; TRY_IT   END;
    IF (RESULT <> 0) AND THREEDRIVES THEN
    BEGIN
      VOLNUM := '#11:'; TRY_IT
    END;
    IF RESULT <> 0 THEN
    BEGIN
      WRITELN (CHR(25), CHR(27), CHR (59)); GOTOXY (2, 10);
      WRITELN (CHR(7), 'No file named ',ENTRY,' could be found in any drive.');
      WRITELN ('PLEASE ENTER A CORRECTED NAME FOR FILE # ',N,':');
      IF N > 0 THEN N := N - 1;
      READLN (ENTRY); WRITELN;
      ADD_TEXT; CHECK_FILES
    END ELSE BEGIN  {RESULT = 0}
              FILENAME[N] := SEEKFILE;
              CLOSE (TESTFILE)
            END;
  END; {CHECK FILES}

  PROCEDURE SHOW_LIST;
  VAR I: INTEGER;
  BEGIN
    CLEAR_SCREEN; WRITELN ('THESE FILES WILL BE PRINTED:');
    WRITELN
  ('-------------------------------------------------------------');
    WRITELN
  (' #                  FILENAME                    STARTING PAGE');
  WRITELN
  ('                          (a blank indicates numbers will simply continue;');
    WRITELN
  ('-------------------------------------------------------------');
    WRITELN; FOR I:= 1 TO N DO
    BEGIN
      WRITE (I:2, FILENAME[I]:28);
      IF PAGENUM[I] <> -1 THEN WRITELN (PAGENUM[I]:25) ELSE WRITELN
    END;
    WRITELN; WRITELN
  ('-------------------------------------------------------------');
    WRITELN; WRITELN
  ('If correct, press <RETURN>; if not, enter any letter to start over.');
    READLN (RESPONSE); IF RESPONSE <> '' THEN GET_FILES;
  END;
```

continued on page 229

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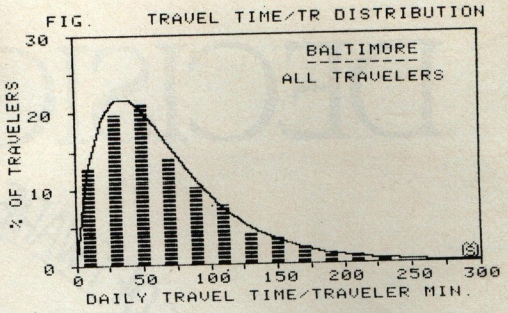

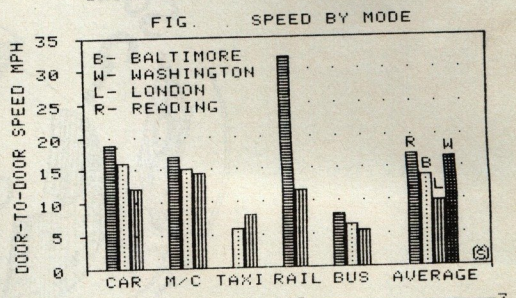

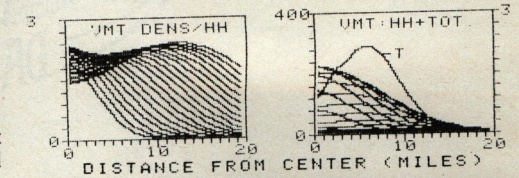

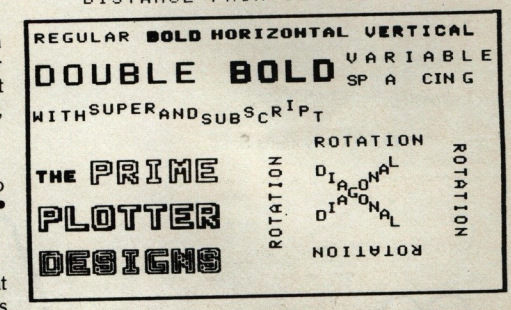

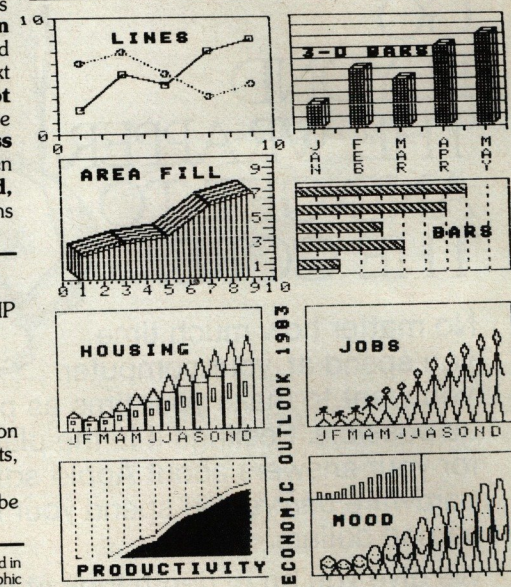

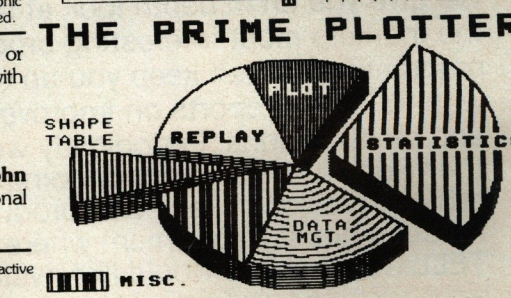

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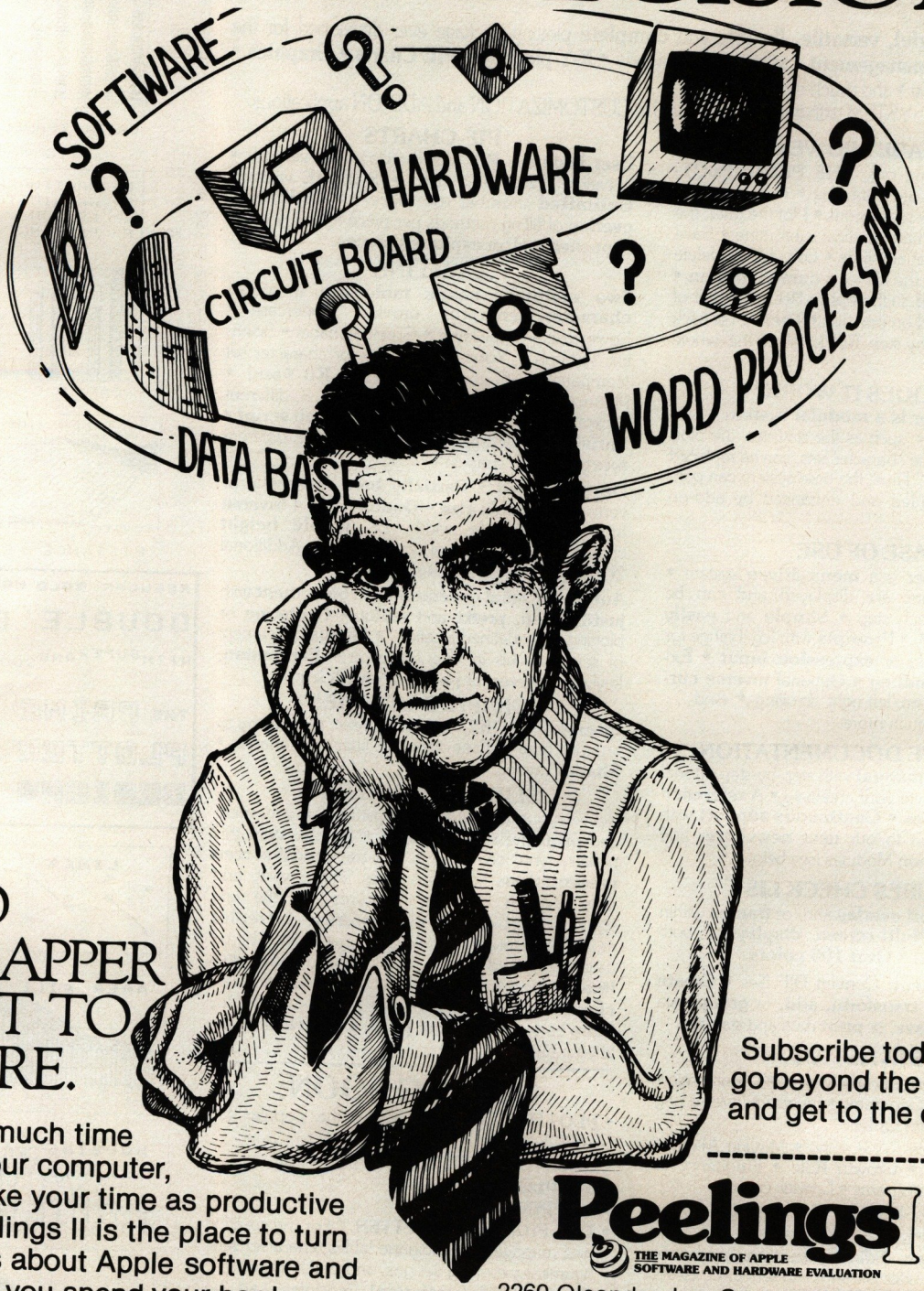

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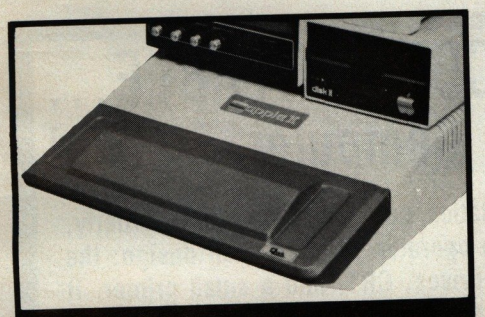
Pascal List Linker (Cont.)

```
'D' : SUB_SCRIPT;
      {ANOTHER PROCEDURE FOR
       HALF-UP}
'_' : UNDER_LINE;
      {IF FEASIBLE ON YOUR PRINTER}
'@' : WRITE (PRINTOUT, '@');
END;
      {CASE STATEMENT}
READ (SOURCEFILE, CH)
      {TO DELETE SIGNAL}
END;
```

You might have other needs and ideas, and your printer might have quite different features from mine. But at least this shows the possibilities, and it certainly gives the Apple Pascal system features which equal those of most commercial text editors. Of course, the advantage of this system is that you can customize it to suit your own needs, whatever they may be, and this is a hard thing to do with the packaged commercial systems. You can also use the Pascal system to analyze your text — as does the CROSSREF program on the Apple3 diskette, for example. I have written a program which picks reference citations out of the text and alphabetizes them for me; this has always been one of my least favorite chores, and the Apple does it patiently, accurately, and without complaint. That is what a computer is supposed to do!



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```
BEGIN {MAIN GET_FILES}
  (*$I-*)
  N:= 0; WRITELN; WRITELN;
  WRITELN ('Does this system include three disk drives?  (Y or N) ');
  READ (CHOICE); WRITELN;
  THREEDRIVES:= CHOICE IN ['Y','y'];
  CLEAR_SCREEN;
  WRITELN ('Now enter the names of the files to be printed by this program.');
  WRITELN ('DO NOT specify the volume name (or number) for the files! ');
  WRITELN ('It is not necessary to add ".text" for each filename.');
  writeln; WRITELN ('Press <RETURN> when all entries are complete.');
  WRITELN ('Enter "page" if you want to start the next file on a new page.');
  writeln ('(This is useful when printing a series of unrelated files.)');
  REPEAT
    N:= N + 1;
    IF N = MAXFILES THEN WRITELN (CHR(7),
       'THIS IS THE LAST FILE THAT CAN BE ENTERED!');
    WRITELN; WRITELN ('What file will be number ',N,'? ');
    READLN (ENTRY);
    IF (ENTRY <> '') AND (ENTRY <> 'PAGE') AND (ENTRY <> 'page') THEN
    BEGIN
      ADD_TEXT;
      CHECK_FILE
    END;
    IF (ENTRY = 'PAGE') OR (ENTRY = 'page') THEN GET_PAGENUM;
  UNTIL (ENTRY = '') OR (N = MAXFILES);
  IF N < MAXFILES THEN N:=N - 1;
  SHOW_LIST;
  (*$I+*)
END;        {GET FILES}

PROCEDURE SET_FORMAT;
  VAR RESPONSE: STRING;
      CHOICE: CHAR;
  BEGIN
    CLEAR_SCREEN;
    WRITELN ('What margin (in inches) at the top and bottom? ');
       READLN (RESPONSE); MARGIN := VALUE (RESPONSE);
       WRITELN; SKIPOVER:= ROUND (6 * MARGIN);
    WRITELN ('How many spaces between lines?');
    WRITE ('       (1, 2, 3, etc.)? ');
       READLN (RESPONSE); SPACING:= ROUND (VALUE (RESPONSE));
       WRITELN;
    WRITELN ('Do you want to pause at the beginning of each page');
    WRITE (' to allow insertion of single sheets of paper? (Y or N) ');
    READ (CHOICE); WRITELN;
          PAUSE := CHOICE IN ['Y', 'y'];
    WRITELN; WRITE ('Do you want page numbers printed? ');
       READ (CHOICE);
          IF CHOICE IN ['Y', 'y'] THEN
          BEGIN
            NUMBER:= TRUE;
            WRITE ('What is the number of the first page? ');
            READLN (PAGE)
          END ELSE NUMBER:= FALSE
  END;      {SETFORMAT}

  PROCEDURE STANDARD_FORM;  {ARRANGE THIS TO SUIT YOUR OWN USUAL FORMATS}
  BEGIN
  CLEAR_SCREEN; NUMBER := TRUE; PAGE := 1;
  WRITELN ('The following "standard" settings are available: '); WRITELN;
  WRITELN ('-------------------------------------------------------------');
  WRITELN (' PARAMETER                                CHOICE       ');
  WRITELN ('----------------  ----------------------------------------');
  WRITELN ('                    #1          #2          #3          #4');WRITELN;
  WRITELN (' Margin (t & b)    1 inch      1 inch      0.67 inch   1 inch');
  WRITELN (' Spacing           double      double      single      single');
  WRITELN (' Pause at bottom    yes         no          no          yes');
  WRITELN ('-------------------------------------------------------------');
  WRITELN (' Pages numbered starting with page 2 in all cases');
  WRITELN (' Choose one of the above, or enter "N" if none of them. ');
    READ (CHOICE); WRITELN;
    CASE (CHOICE) OF
          '1': BEGIN
                 SKIPOVER := 6; SPACING := 2; PAUSE := TRUE;
               END;
          '2': BEGIN
                 SKIPOVER := 6; SPACING := 2; PAUSE := FALSE;
               END;
          '3': BEGIN
                 SKIPOVER := 4; SPACING := 1; PAUSE := FALSE;
               END;
          '4': BEGIN
                 SKIPOVER := 6; SPACING := 1; PAUSE := FALSE;
               END;
          'N','n': SET_FORMAT;
    END;    {CASE STATEMENT}
  END;
```

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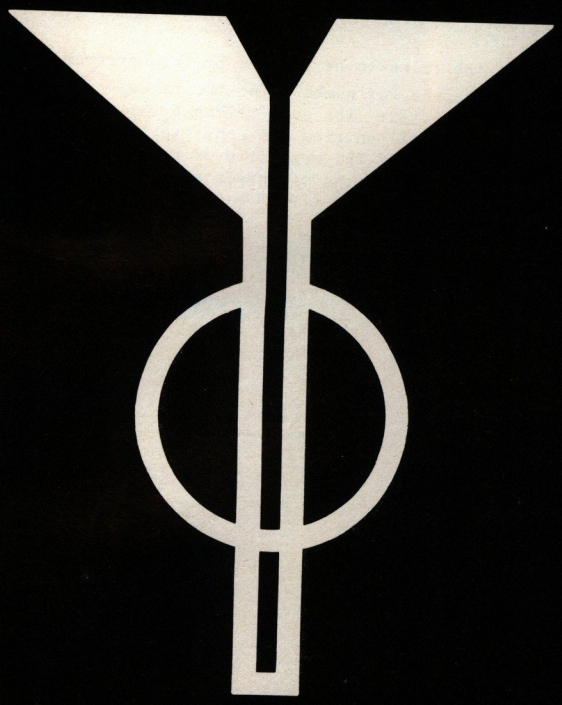
MEDICAL



STUDY BASE

STUDY BREAK is a program designed to produce and utilize study files on any subject. The aim of the program is to allow easy review of information that requires repetitive exposure for mastery. The program is menu driven, allowing the review of old material, insertion of new material, modification of current material or deletion of current material. No knowledge of computers beyond inserting disks into drives is required. The new items of information are entered in a question-answer format; the review of a study base proceeds by the program asking a question, allowing the student time to think of an answer and then showing the answer when requested. If the student sees that he has thought of the wrong answer, he places the missed item in a review file and proceeds to the next question. At a user-selected number of questions after this, the missed questions are reshown to reinforce the information. At the end of each session, the percentage of correct responses is displayed. The study items in a file can be viewed in a sequential or random fashion, and the choice of starting question is determined by the user. The program is not designed for multiple choice or true-false questions, but rather the answer to the question must be known without prompting.

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Pascal List Linker (Cont.)

```
    PROCEDURE PAPER_INSERT; {TO ALLOW REPLACEMENT OF SINGLE PAPER SHEETS}
    VAR I: INTEGER;
    BEGIN
      WRITELN ('Insert paper and align top edge for page ',PAGE,' of file ',
      FILENAME [J],'.');
      WRITELN ('                PRESS RETURN KEY TO CONTINUE PRINTING.  ');
      WRITE (CHR (7));
      READLN (RESPONSE)
    END;   {PAPER_INSERT}

    PROCEDURE TOP_PAGE;
    VAR I: INTEGER;
    BEGIN
      LINES := 0;
      IF PAUSE THEN PAPER_INSERT;
      IF PAGE <> 1 THEN
      WRITELN ('~~~~~~~~~ NOW PRINTING PAGE ',PAGE,' FROM FILE ',FILENAME[J],
         '~~~~~~~~~');
      IF SKIPOVER > 2 THEN   {NEED AT LEAST 3 LINES TO PRINT PAGE NUMBER}
      BEGIN
        WRITELN (PRINTOUT);
        IF NUMBER AND (PAGE <> 1) THEN WRITELN (PRINTOUT,' ':36,'Page ',PAGE)
           ELSE WRITELN (PRINTOUT);
        PAGE:= PAGE + 1;
        FOR I:= 1 TO (SKIPOVER - 3) DO WRITELN (PRINTOUT)
      END  ELSE PAGE := PAGE + 1
    END;     {TOP_PAGE}

    PROCEDURE BOTTOM_PAGE;
    BEGIN
      WRITELN (PRINTOUT, CHR (12));      {ASCII FORMFEED}
      TOP_PAGE;
    END;     {BOTTOM_PAGE}
    PROCEDURE LINE_FEED;   {TAKES CARE OF SPACING AND LINE COUNTING}
    VAR I:INTEGER;
    BEGIN
      FOR I:= 1 TO SPACING  DO
      BEGIN
        LINES := LINES + 1;
        WRITELN (PRINTOUT);
        IF LINES >= (PAGELENGTH - 2*SKIPOVER) THEN
        BEGIN
          BOTTOM_PAGE;
          EXIT (LINE_FEED)
        END;
      END;  {FOR I...}
    END;    {LINE_FEED}
    PROCEDURE READ_FILE;
    VAR I, LINESPACE: INTEGER;
    BEGIN
      REPEAT
        READLN (SOURCEFILE, TEXTLINE);
        WRITE (PRINTOUT, TEXTLINE);
        LINE_FEED
      UNTIL EOF (SOURCEFILE);
    END;  {READ_FILE}
    BEGIN {MAIN PROGRAM}
      FOR J:= 1 TO MAXFILES DO PAGENUM[J] := -1;  {FOR PAGE SIGNALS}
      GENERAL_INSTRUCTIONS;
      REWRITE (PRINTOUT, 'PRINTER:');
      GET_FILES;
      STANDARD_FORM;
      CLEAR_SCREEN;
      WRITELN ('PUSH THE "TOF" SWITCH ON THE PRINTER, ');
      WRITELN ('          AND THEN PRESS <RETURN> TO START PRINTING.');
      READLN (RESPONSE);
      J:= 1; TOP_PAGE;
      LINES := 0;
      FOR J:= 1 TO N DO
      BEGIN
        CLEAR_SCREEN;
        IF PAGENUM [J] <> -1 THEN
        BEGIN
          PAGE := PAGENUM [J];
          IF LINES <> 0 THEN BOTTOM_PAGE  {AVOID BLANK IF FILE ENDS AT BOTTOM}
        END;
        RESET (SOURCEFILE, FILENAME [J]);
        WRITELN (':::::::::::::::::: NOW PRINTING ',FILENAME [J],
             '::::::::::::::::::');
        READ_FILE;
        CLOSE (SOURCEFILE, LOCK)
      END;
      WRITELN;
      WRITELN ('*************************************************************');
      WRITELN ('******************** OUTPUT COMPLETED ***********************');
      WRITELN ('*************************************************************')
    END.
```

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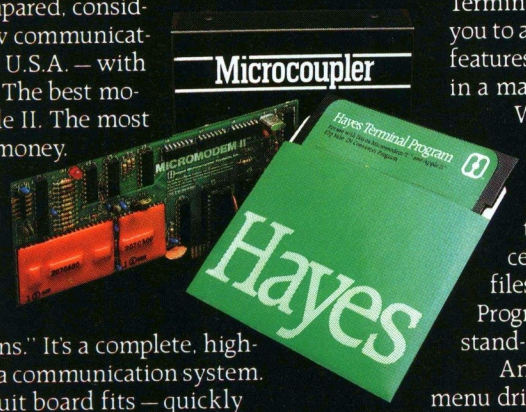

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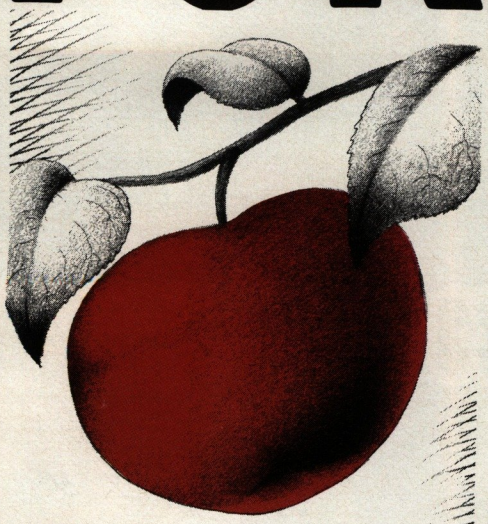

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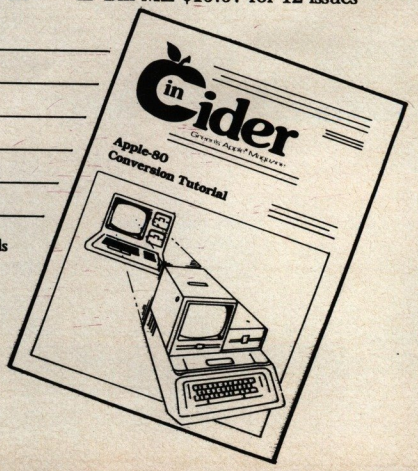

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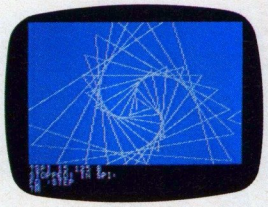

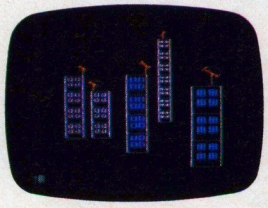

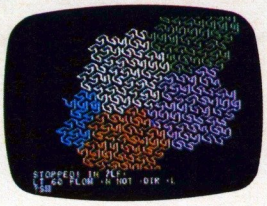

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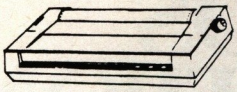

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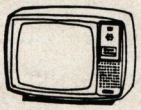

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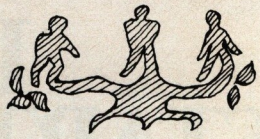

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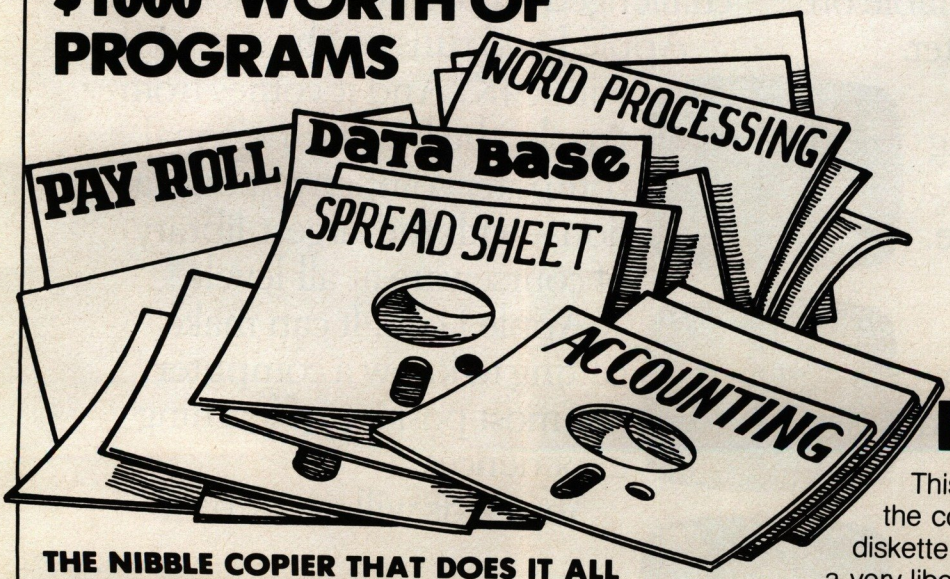

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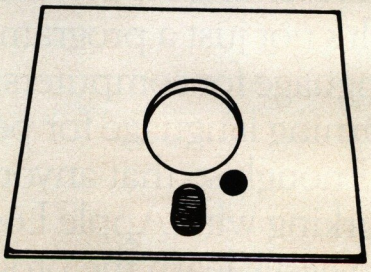

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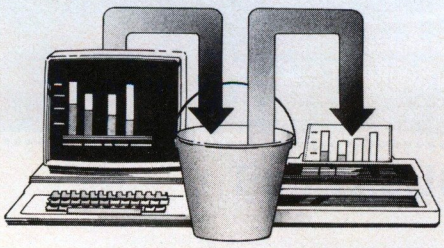

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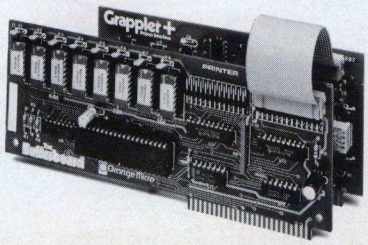

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The Bufferboard is made by Orange Micro, Inc.; the same people who brought you the popular Grappler + printer interface. Both the Grappler + and The Bufferboard are now available at your local Apple dealer.

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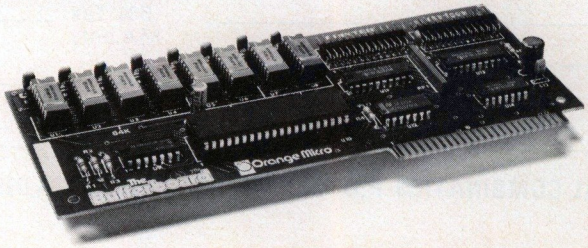

The Bufferboard™
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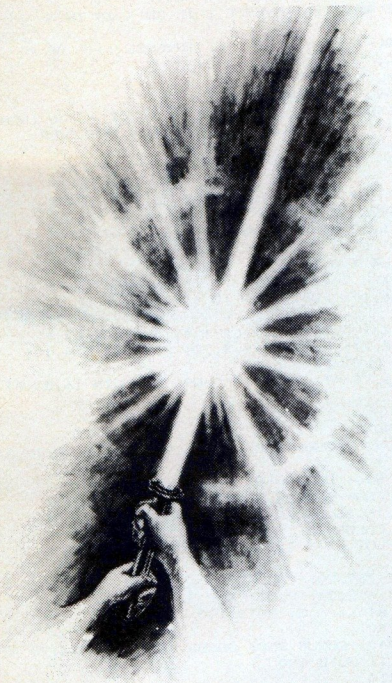

Lightsabre Battle

by Michael Lenz, age 13
3245 Rock Hollow Rd.
Oklahoma City, OK 73120

In the immense, deserted reactor shaft in the cloud city of Bespin, Darth Vader and Luke Skywalker battle to the death, armed only with meter-long lightsabres...

Lightsabre Battle is an exciting game in color graphics for two players. It simulates the classic battle between Darth and Luke, using the game paddles. Paddle zero controls Luke and paddle one controls Darth. Turning the paddle causes the corresponding player to move in the direction in which it is turned, and replacing it in the center stops him. The buttons on the paddles swing the players' lightsabres. The object of the game is to be the first player to reach a score of at least 25 points by hitting your opponent with your lightsabre.

HOW TO GET POINTS

If a player is near his opponent when he swings, it is considered a hit, and he receives from one to five points. The most points are scored when he is directly in front of his opponent, and fewer when he is close or too far away. (Note that you can pass your opponent, and during a pass the players overlap.) If **both** players swing simultaneously, they block each other's swings and no hits can be made. When a player swings and does not hit or block, a swing is counted on the scoreboard. When a player swings five times (without a hit), his opponent gets a hit and five points. After a hit, both players' swings go to zero. The game is over when one of the players reaches 25 or more points.

LINE-BY-LINE DESCRIPTION

The program is divided into many sections. Here is a list, by line numbers, that explains each section:

Lines 20-160 — Draw lights and catwalk, print scoreboard, draw Darth and Luke, etc.

170-250 — Read paddle zero (P0) and paddle one (P1) and read both buttons.

Lines 260-770 — Routines to swing lightsabres and accumulate points, and announce winner at the end of the game.

Lines 780-930 — Routines to move players in direction of paddle.

Lines 940-1050 — Subroutines to draw players and play music.

Lines 1060-1460 — Print introduction and instructions.

(**Important!** If you run sections of the program before you have finished entering it, be sure you have POKED in the values at lines 1470–1480 or the program will bomb!)

CUSTOMIZING THE PROGRAM

Many changes can be made to the program to suit your individual taste in addition to those covered here.

Players can be given handicaps by changing the number of hits needed to win the game, and the number of swings needed to get a hit for one of the players. Experiment with lines **350, 480, 570, 580, 600 and 610. Variable names starting with 'L'** are for Luke, and those starting with **'D'** are for Darth.

To personalize the game, it is possible to change Luke's and Darth's names and appearances. Names are easy to change: just change the values of **P$(0)** and **P$(1)** in **line 20**. Make the names shorter than 15 characters each, though, to avoid confusion and possible errors.

Redraw the players by changing the routines in **line 940-960** for Luke, and **970-980** for Darth, but don't enlarge them. You can also change their colors by changing **lines 110, 120, 520, 800, 880** and **1020-1050**. Make the colors in each line the same. (Possible suggestions: Give Luke hair by adding a **VLIN 17,18 AT LX-1** in **line 950** before the **RETURN**. Or, give both him and Darth eyes by adding a **PLOT LX,17 at line 960**, and a **PLOT DX,17** at line 980!)

Another possible addition to the game would be to count the number of times Luke wins and Darth wins (using the variables **LW** and **DW**), and print them out at the end of the match. See if you can figure out how to do this. One complication, though, is the **'CLEAR'** command at **line 700**, which would have to be changed to **IF ZZ=217 THEN LS=0: DS=0: LH=0: DH=0: F=1: GOTO 20**

There are many other customizations that are possible, which I won't cover here. Now, let's forget about the formalities and get on with the battle!

continued on next page

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Lightsabre Battle (Cont.)

The Shape, LightSabre Battle, Price Demo, Scroll, and Lower Case Writer are available on diskette for an introductory price of $17.95 plus $1.50 shipping/handling ($2.50 outside the U.S.) from NIBBLE, P.O. Box 325, Lincoln, MA 01773. Offer expires Jan. 31, 1983.

```
1  REM   ***********************
2  REM   * LIGHTSABRE BATTLE  *
3  REM   *  BY MICHAEL LENZ   *
4  REM   * COPYRIGHT (C) 1982 *
5  REM   * BY MICRO-SPARC INC *
6  REM   * LINCOLN, MA. 01773 *
7  REM   ***********************
10  GOSUB 1060
20 P$(0) = "LUKE":P$(1) = "DARTH":LX = 7:DX = 27
30  HOME : GR : COLOR= 2: FOR I = 0 TO 39: HLIN 0,39 AT
     I: NEXT
40  FOR I = 1 TO 30: COLOR=  INT ( RND (1) * 16): PLOT
     INT ( RND (1) * 40), INT ( RND (1) * 40)
50  POKE 768, INT ( RND (1) * 255): POKE 769,20: CALL 770:
     NEXT
60  COLOR= 15: FOR I = 29 TO 32: HLIN 2,32 AT I: NEXT :
     FOR I = 27 TO 34: HLIN 0,1 AT I: HLIN 33,37 AT I:
     NEXT
70  VLIN 8,26 AT 35: VLIN 35,39 AT 35: VLIN 9,11 AT 34:
     VLIN 9,11 AT 36: VLIN 13,15 AT 33: VLIN 13,15 AT
     37
80  PLOT 34,14: PLOT 36,14: PLOT 33,10: PLOT 37,10: COLOR=
     2: PLOT 35,10
90  VTAB 21: HTAB 1: PRINT "* "P$(0)" *";: HTAB 36 -  LEN
     (P$(1)): PRINT "* "P$(1)" *": VTAB 23
100  PRINT "  HITS";: HTAB 34: PRINT "HITS": PRINT "  SWINGS";:
     HTAB 32: PRINT "SWINGS";
110  COLOR= 11: GOSUB 940: COLOR= 8: GOSUB 950: COLOR=
     15: GOSUB 960
120  COLOR= 0: GOSUB 970: COLOR= 5: GOSUB 990
130  IF  NOT F THEN  FOR I = 1 TO 1000: NEXT : GOSUB 1000
140  VTAB 22: HTAB 8: PRINT "LIGHT YOUR LIGHTSABRES!": FOR
     I = 1 TO 1000: NEXT
150  VTAB 22: CALL  - 868: VTAB 22: HTAB 12: INVERSE : PRINT
     "LIGHTSABRE BATTLE": COLOR= 7: VLIN 16,20 AT LX +
     2: COLOR= 9: VLIN 16,20 AT DX - 2
160  NORMAL : FOR I = 1 TO 20:ZZ =  PEEK ( - 16336): NEXT

170 P0 =  PDL (0): IF P0 < 85 THEN 780
180  IF P0 > 170 THEN 840
190 P1 =  PDL (1): IF P1 < 85 THEN 860
200  IF P1 > 170 THEN 920
210  IF  PEEK ( - 16287) > 127 AND  PEEK ( - 16286) < 128 THEN
     260
220  IF  PEEK ( - 16286) > 127 AND  PEEK ( - 16287) < 128 THEN
     390
230  IF  PEEK ( - 16287) > 127 AND  PEEK ( - 16286) > 127 THEN
     720
240  IF  PEEK ( - 16384) = 155 THEN  POKE  - 16368,0: GOTO
     600
250  GOTO 170
260  COLOR= 2: VLIN 16,20 AT LX + 2: COLOR= 7: HLIN LX +
     3,LX + 8 AT 21
270  FOR I = 1 TO 10:ZZ =  PEEK ( - 16336): NEXT
280  COLOR= 2: HLIN LX + 3,LX + 8 AT 21: COLOR= 7: VLIN
     16,20 AT LX + 2
290  IF DX < LX + 3 OR DX > LX + 8 THEN LS = LS + 1: GOTO
     540
300  IF DX = LX + 8 OR DX = LX + 3 THEN LH = LH + 1: GOTO
     340
310  IF DX = LX + 7 OR DX = LX + 4 THEN LH = LH + 2: GOTO
     340
320  IF DX = LX + 6 THEN LH = LH + 3: GOTO 340
330 LH = LH + 5
340  COLOR= 0: GOSUB 370: FOR I = 1 TO 400: NEXT : COLOR=
     2: GOSUB 370
350  IF LH > 24 THEN 600
360 LS = 0:DS = 0: GOTO 500
370  VLIN 8,12 AT 12: VLIN 8,12 AT 14: PLOT 13,8: PLOT
     13,12
380  VLIN 8,12 AT 16: VLIN 8,12 AT 20: PLOT 17,11: PLOT
     19,11: PLOT 18,10: VLIN 8,10 AT 22: PLOT 22,12: RETURN

390  COLOR= 2: VLIN 16,20 AT DX - 2: COLOR= 9: HLIN DX -
     8,DX - 3 AT 21
400  FOR I = 1 TO 10:ZZ =  PEEK ( - 16336): NEXT
410  COLOR= 2: HLIN DX - 8,DX - 3 AT 21: COLOR= 9: VLIN
     16,20 AT DX - 2
420  IF DX < LX + 3 OR DX > LX + 8 THEN DS = DS + 1: GOTO
     540
430  IF DX = LX + 8 OR DX = LX + 3 THEN DH = DH + 1: GOTO
     470
440  IF DX = LX + 7 OR DX = LX + 4 THEN DH = DH + 2: GOTO
     470
450  IF DX = LX + 6 THEN DH = DH + 3: GOTO 470
460 DH = DH + 5
470  COLOR= 15: GOSUB 370: FOR I = 1 TO 400: NEXT : COLOR=
     2: GOSUB 370
480  IF DH > 24 THEN 600
490 DS = 0:LS = 0
500  COLOR= 2: GOSUB 940: GOSUB 950: GOSUB 960: GOSUB 970:
     GOSUB 990
510  VLIN 16,20 AT LX + 2: VLIN 16,20 AT DX - 2:LX = 7:
     DX = 27
520  COLOR= 11: GOSUB 940: COLOR= 8: GOSUB 950: COLOR=
     15: GOSUB 960: COLOR= 0: GOSUB 970: COLOR= 5: GOSUB
     990
530  COLOR= 7: VLIN 16,20 AT LX + 2: COLOR= 9: VLIN 16,20 AT
     DX - 2
540  VTAB 23: NORMAL : HTAB 8: IF LH < 10 THEN  PRINT 0;
550  PRINT LH;: HTAB 31: IF DH < 10 THEN  PRINT 0;
560  PRINT DH: HTAB 10: PRINT OLS;: HTAB 29: PRINT ODS;
570  IF LS >  = 5 THEN 460
580  IF DS >  = 5 THEN 330
590  GOTO 240
600  HOME : IF LH > 24 THEN  GOSUB 1040: PRINT P$(0)" WINS!!!"
610  IF DH > 24 THEN  GOSUB 1020: PRINT P$(1)" WINS!!!"
620  FOR I = 250 TO 10 STEP  - 10: POKE 768,I: POKE 769,10:
     CALL 770: NEXT
630  FOR I = 20 TO 250 STEP 10: POKE 768,I: POKE 769,10:
     CALL 770: NEXT
640  FOR I = 1 TO 10: PRINT  CHR$ (7);: NEXT
650  PRINT "THE SCORE WAS ";: INVERSE : IF LH < 10 THEN
     PRINT 0;
660  PRINT LH;: NORMAL : PRINT " TO ";: INVERSE : IF DH <
     10 THEN  PRINT 0;
670  PRINT DH;: NORMAL : PRINT "."
680  PRINT : PRINT "ANOTHER GAME (Y/N)?";
690 ZZ =  PEEK ( - 16384): POKE  - 16368,0: IF ZZ = 206 THEN
     HOME : PRINT "MAY THE FORCE BE WITH YOU...WHEREVER
     YOUGO!": END
700  IF ZZ = 217 THEN  CLEAR :F = 1: GOTO 20
710  GOTO 690
720  IF DX < LX + 3 OR DX > LX + 10 THEN F =  NOT F: ON
     F + 1 GOTO 260,390
730  COLOR= 2: VLIN 16,20 AT LX + 2: VLIN 16,20 AT DX -
     2: COLOR= 7: PLOT LX + 3,20: PLOT LX + 4,19: PLOT
     LX + 5,18: PLOT LX + 6,17
740  COLOR= 9: PLOT DX - 3,20: PLOT DX - 4,19: PLOT DX -
     5,18: PLOT DX - 6,17: FOR I = 1 TO 10:ZZ =  PEEK ( -
     16336): NEXT
750  COLOR= 2: PLOT LX + 3,20: PLOT LX + 4,19: PLOT LX +
     5,18: PLOT LX + 6,17: PLOT DX - 3,20: PLOT DX - 4,19:
     PLOT DX - 5,18: PLOT DX - 6,17
760  COLOR= 7: VLIN 16,20 AT LX + 2: COLOR= 9: VLIN 16,20 AT
     DX - 2
770  GOTO 240
780  IF LX = 7 THEN 190
790  COLOR= 2: GOSUB 940: GOSUB 950: GOSUB 960: VLIN 16,20 AT
     LX + 2:LX = LX - 1
800  COLOR= 11: GOSUB 940: COLOR= 8: GOSUB 950: COLOR=
     15: GOSUB 960: COLOR= 0: GOSUB 970: COLOR= 5: GOSUB
     990: COLOR= 7: VLIN 16,20 AT LX + 2: COLOR= 9: VLIN
     16,20 AT DX - 2: COLOR= 8
810  PLOT LX - 2,24: PLOT LX - 3,25: PLOT LX - 4,26: VLIN
     27,28 AT LX - 5
820  POKE 768,25: POKE 769,20: CALL 770
830  COLOR= 2: PLOT LX - 2,24: PLOT LX - 3,25: PLOT LX -
     4,26: VLIN 27,28 AT LX - 5: GOTO 190
840  IF LX = 23 THEN 190
850  COLOR= 2: GOSUB 940: GOSUB 950: GOSUB 960: VLIN 16,20 AT
     LX + 2:LX = LX + 1: GOTO 800
860  IF DX = 11 THEN 210
870  COLOR= 2: GOSUB 970: GOSUB 990: VLIN 16,20 AT DX -
     2:DX = DX - 1
880  COLOR= 0: GOSUB 970: COLOR= 5: GOSUB 990: COLOR= 11:
     GOSUB 940: COLOR= 8: GOSUB 950: COLOR= 15: GOSUB
     960: COLOR= 9: VLIN 16,20 AT DX - 2: COLOR= 7: VLIN
     16,20 AT LX + 2: COLOR= 0
890  PLOT DX + 2,24: PLOT DX + 3,25: PLOT DX + 4,26: COLOR=
     5: VLIN 27,28 AT DX + 5
900  POKE 768,240: POKE 769,20: CALL 770
910  COLOR= 2: PLOT DX + 2,24: PLOT DX + 3,25: PLOT DX +
     4,26: VLIN 27,28 AT DX + 5: GOTO 210
920  IF DX = 27 THEN 210
930  COLOR= 2: GOSUB 970: GOSUB 990: VLIN 16,20 AT DX -
     2:DX = DX + 1: GOTO 880
940  VLIN 17,19 AT LX - 1: VLIN 17,18 AT LX: PLOT LX +
     2,21: RETURN
950  VLIN 23,28 AT LX: VLIN 20,21 AT LX: PLOT LX + 1,21:
     PLOT LX - 1,23: PLOT LX + 1,28: RETURN
960  VLIN 20,22 AT LX - 1: PLOT LX,22: RETURN
970  VLIN 17,19 AT DX + 1: VLIN 17,18 AT DX: HLIN DX -
     2,DX AT 21: VLIN 23,26 AT DX
980  PLOT DX + 1,23: PLOT DX,20: RETURN
990  VLIN 27,28 AT DX: VLIN 20,22 AT DX + 1: PLOT DX,22:
     PLOT DX - 1,28: RETURN
1000  READ PI,TI: IF PI =  - 99 THEN  RETURN
1010  POKE 768,PI: POKE 769,TI: CALL 770: GOTO 1000
1020  COLOR= 2: GOSUB 940: GOSUB 950: GOSUB 960: VLIN 16,20 AT
     LX + 2: COLOR= 11: HLIN 3,5 AT 28: HLIN 3,4 AT 27:
     PLOT 7,25: COLOR= 15: HLIN 6,8 AT 28: PLOT 8,27
1030  COLOR= 8: HLIN 6,7 AT 27: PLOT 7,26: HLIN 9,13 AT
     27: PLOT 13,26: PLOT 9,28: COLOR= 0: GOSUB 970: COLOR=
     5: GOSUB 990: RETURN
1040  COLOR= 2: GOSUB 970: GOSUB 990: VLIN 16,20 AT DX -
     2: COLOR= 0: HLIN 28,30 AT 28: HLIN 29,30 AT 27: HLIN
     26,27 AT 27: VLIN 25,26 AT 26: HLIN 23,24 AT 27: PLOT
     24,28
1050  COLOR= 5: HLIN 25,27 AT 28: PLOT 25,27: HLIN 21,22 AT
     27: PLOT 21,26: COLOR= 11: GOSUB 940: COLOR= 8: GOSUB
     950: COLOR= 15: GOSUB 960: RETURN
1060  POKE 50,255: SPEED= 255
1070  TEXT : HOME : GOSUB 1470
1080  VTAB 24: HTAB 11: INVERSE : PRINT "LIGHTSABRE BATTLE";:
     NORMAL
1090  FOR I = 240 TO 20 STEP  - 10: POKE 768,I: POKE 769,10:
     CALL 770: CALL  - 912: NEXT
1100  VTAB 3: HTAB 12: PRINT "BY MICHAEL LENZ": HTAB 10:
     PRINT "INSTRUCTIONS (Y/N)?"
1110 ZZ =  PEEK ( - 16384): POKE  - 16368,0: IF ZZ = 217 THEN
     1130
1120  IF ZZ <  > 206 THEN 1110
1130  HOME : FOR I = 20 TO 240 STEP 10: POKE 768,I: POKE
     769,10: CALL 770: NEXT
1140  IF ZZ = 206 THEN  RETURN
1150  INVERSE : PRINT  SPC( 40);: FOR I = 2 TO 22: VTAB
     I: HTAB 1: PRINT " ";: HTAB 40: PRINT " ";: NEXT :
     VTAB 23: PRINT  SPC( 40);: NORMAL
1160  POKE 33,38: POKE 32,1: POKE 34,1: POKE 35,22
1170  VTAB 1: HTAB 14: INVERSE : PRINT "INSTRUCTIONS": VTAB
     23: HTAB 9: PRINT "HIT ANY KEY TO CONTINUE": NORMAL
     : SPEED= 125
1180  VTAB 3: HTAB 1: PRINT "   IN THE IMMENSE, DESERTED
     REACTOR"
1190  PRINT "SHAFT IN THE CLOUD CITY OF BESPIN,"
1200  PRINT "DARTH VADER AND LUKE SKYWALKER BATTLE"
1210  PRINT "A DEATH DUEL ARMED ONLY WITH TWO"
1220  PRINT "METER-LONG LIGHTSABRES! THIS GAME"
1230  PRINT "SIMULATES THAT DUEL IN COLOR GRAPHICS.";
1240  PRINT "ONE PLAYER IS DARTH, WHO IS CONTROLLED";
1250  PRINT "BY PADDLE ONE, AND THE OTHER PLAYER"
1260  PRINT "IS LUKE WHO USES PADDLE ZERO. EACH"
1270  PRINT "PLAYER STARTS AT ONE END OF THE "
1280  PRINT "CATWALK. AS THEY TURN THE PADDLES,"
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continued on next page

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1290  PRINT "THEIR MEN MOVE IN THE CORRESPONDING"
1300  PRINT "DIRECTION. WHEN A PLAYER IS DIRECTLY"
1310  PRINT "IN FRONT OF HIS OPPONENT, PUSHING THE"
1320  PRINT "PADDLE BUTTON SWINGS HIS LIGHTSABRE."
1330  IF  PEEK ( - 16384) < 128 THEN 1330
1340  POKE  - 16368,0: HOME : VTAB 6: HTAB 1
1350  PRINT "HE RECEIVES POINTS DEPENDING ON HOW"
1360  PRINT "CLOSE OR FAR AWAY HE IS FROM HIS"
1370  PRINT "OPPONENT. EACH PLAYER HAS FIVE SWINGS"
1380  PRINT "PER HIT, AND WHEN THEY ARE USED UP HIS";
1390  PRINT "OPPONENT GETS CREDIT FOR A HIT. IF"
1400  PRINT "BOTH PLAYERS SWING SIMULTANEOUSLY,"
1410  PRINT "THEY BLOCK EACH OTHER AND NO SWINGS"
1420  PRINT "ARE COUNTED. THE GAME IS OVER WHEN ONE";
1430  PRINT "OF THE PLAYERS REACHES AT LEAST 25"
1440  PRINT "POINTS."
1450  IF  PEEK ( - 16384) < 128 THEN 1450
1460  POKE  - 16368,0: TEXT : SPEED= 255: RETURN
1470  FOR I = 770 TO 790: READ ZZ: POKE I,ZZ: NEXT : RETURN

1480  DATA  173,48,192,136,208,5,206,1,3,240,9,202,208,245,174,0
      ,3,76,2,3,96
1490  DATA  228,100,228,100,228,100,171,220,114,220,128,100,136,
      100,152,100,85,220,114,220,128,100,136,100,152,100,85,220,1
      14,220,128,100,136,100,128,100,152,255
1500  DATA  228,100,228,100,228,100,171,220,114,220,128,100,136,
      100,152,100,85,220,114,220,128,100,136,100,152,100,85,220,1
      14,220,128,100,136,100,128,100,152,255

1510  DATA -99,0: REM  S/W MUSIC
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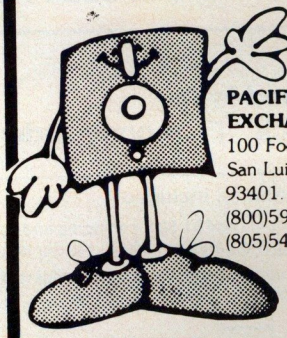

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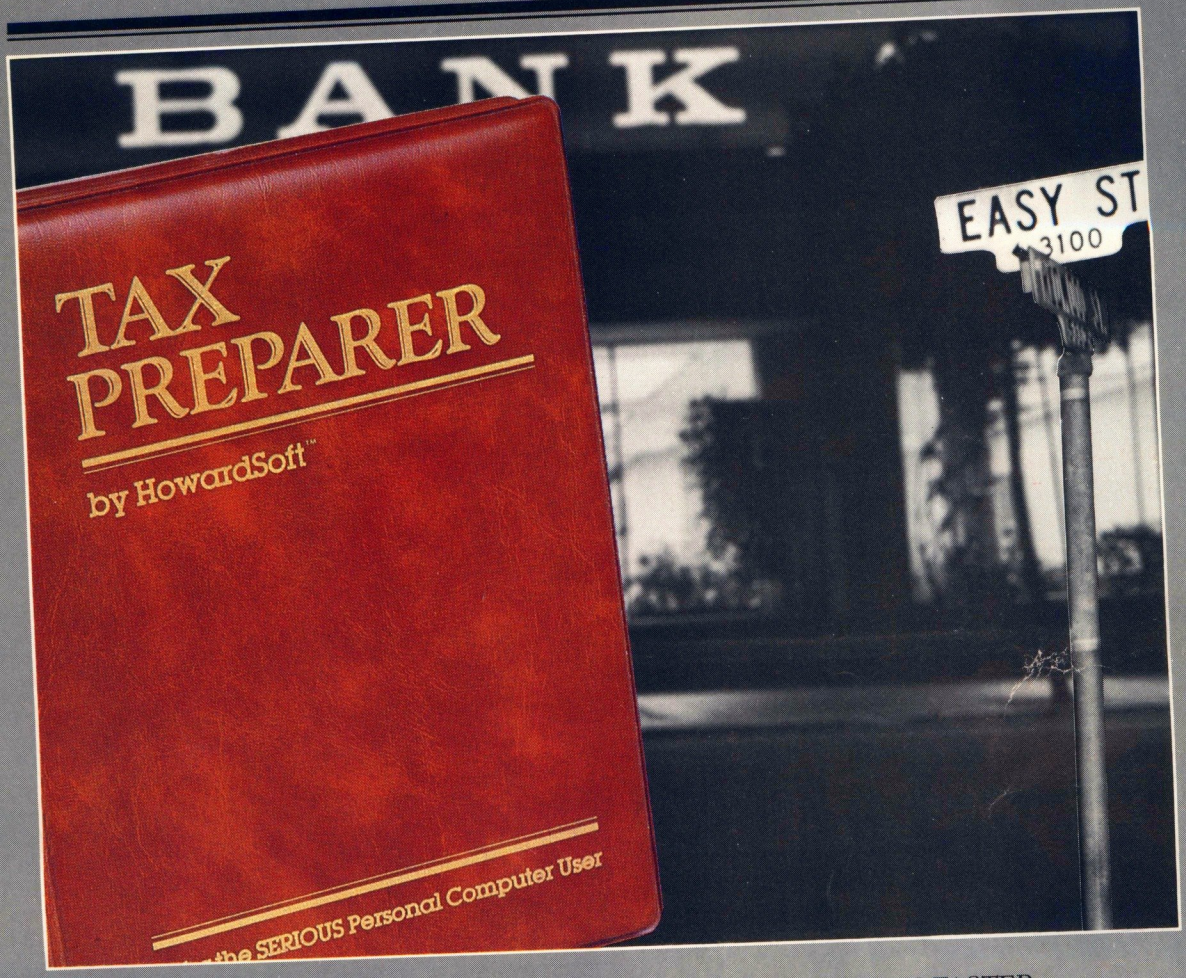

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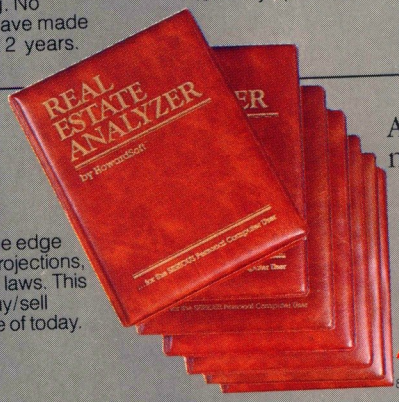

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